

Muelleria

Volume 6

Number 6

February, 1988

NATIONAL HERBARIUM OF VICTORIA

PUBLIC LANDS & FORESTS DIVISION

DEPARTMENT OF CONSERVATION, FORESTS AND LANDS



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CONTENTS

Volume 6, Number 6	Page
Two new species of <i>Brachyscome</i> Cass. (Compositae: Astereae), with a note on the orthography of the generic name — P. S. Short	389
Three new species of <i>Phebalium</i> Vent. sect. <i>Eriostemoides</i> Endl. (Rutaceae) from south-eastern Australia — Neville G. Walsh and David E. Albrecht	399
Nomenclatural notes on <i>Callistemon</i> R. Br. (Myrtaceae) — P. F. Lumley and R. D. Spencer	411
New species of <i>Buckinghamia</i> F. Muell. and <i>Stenocarpus</i> R. Br. (Proteaceae) from northern Queensland — D. B. Foreman and B. P. M. Hyland	417
Notes on <i>Hovea</i> R. Br. (Fabaceae) : 1 — J. H. Ross	425
Two new species of <i>Pomaderris</i> Labill. (Rhamnaceae) from south-eastern New South Wales — Neville G. Walsh	429
A name change in the genus <i>Acmena</i> DC. (Myrtaceae) — G. P. Guymer and B. P. M. Hyland	437
New species of <i>Caladenia</i> R. Br. (Orchidaceae) from Victoria and New South Wales, Australia — G. W. Carr	439
The botanist Joachim Steetz (1804-1862) — P. S. Short and D. M. Sinkora	449
The lichen genera <i>Heppia</i> and <i>Peltula</i> in Australia — Rex B. Filson	495
Muelleria: distribution dates and publication summary — Helen I. Aston	519

Editor: Helen I. Aston

Published by the National Herbarium of Victoria (MEL).
Royal Botanic Gardens, South Yarra, Victoria 3141, Australia.

The date of distribution of **Volume 6, number 5** was 1 April 1987.

TWO NEW SPECIES OF *BRACHYSCOME* Cass. (COMPOSITAE: ASTEREEAE), WITH A NOTE ON THE ORTHOGRAPHY OF THE GENERIC NAME

by

P. S. SHORT*

ABSTRACT

Short, P. S. Two new species of *Brachyscome* Cass. (Compositae: Astereae), with a note on the orthography of the generic name. *Muelleria* 6(6) : 389-398 (1988). — *Brachyscome formosa* sp. nov., from New South Wales, and *B. halophila* sp. nov., from Western Australia, are described. The orthography *Brachyscome*, not *Brachycome*, should be adopted as the latter does not comply with the requirements of the International Code of Botanical Nomenclature.

GENERIC AND SUBGENERIC NOMENCLATURE

The generic name *Brachyscome* Cass. (1816) was deliberately so spelled by Cassini and was used by him on three further occasions (Cassini 1817a,b) in *Dict. Sci. Nat.* In 1825 he considered his original spelling to be erroneous and changed it to *Brachycome*, noting that “C’est ainsi qu’il faut écrire ce nom générique au lieu de *Brachyscome*”, [it is thus that this generic name should be written, instead of *Brachyscome*]. Numerous authors subsequently adopted the spelling *Brachycome*, including Bentham (1867) and Davis (1948, 1949). The latter author was responsible for the latest revision of the genus. However it was recognized by Davis (1948) that the spelling *Brachyscome* did have priority. She commented that “to alter the terminology of the whole group by not accepting Cassini’s later correction would be pressing the law of priority to ridiculous lengths” (Davis 1948, p. 142). Soon after, a proposal to conserve the spelling *Brachycome* over *Brachyscome* was put forward to the Special Committee for Pteridophyta and Phanerogamae (Pichi-Sermolli, 1954). The vote for conservation of *Brachycome* was “In favour of conservation 1; Against conservation 3; Against (conservation unnecessary) 5; Abstention 1.” The vote for conservation was clearly lost but the question as to the preferred spelling of the name was not resolved. It seems that those who deemed it unnecessary to conserve the name felt that the whole question was one of orthography not conservation. Presumably they felt that the spelling *Brachycome* could be, perhaps should be, used. Those members of the committee who simply voted against conservation presumably did so because they felt that the original spelling should be retained. Opinion was clearly divided and soon after the original spelling began to find favour with some Australian botanists. Thus Eichler (1965, p. 297) stated that “There appears no reason to consider the original spelling *Brachyscome* as being orthographically or typographically wrong, and the alteration by Cassini to *Brachycome* thus seems to be not in accordance with Art. 73 of the International Code of Botanical Nomenclature (1961), according to which retention of the original spelling of a name is requested or, in any case, permissible”. Walker and Robinson (1979), Chapman (1980), Stace (1981), Elliot and Jones (1982), Barker (as editor of various papers in Barker and Greenslade 1982) and Stanley (1986) followed the example set by Eichler. Farr *et al.* (1979) also adopted the spelling *Brachyscome* in “Index Nominem Genericorum”.

Despite Eichler’s (l.c.) lead some botanists, e.g. Willis (1973) and Cooke (1985, 1986) have retained the spelling *Brachycome*. The spelling is also used in the first volume of the “Flora of Australia” (George 1981, p. 1) but with the comment that “it will sometimes be necessary to make arbitrary decisions on points of taxonomy and nomenclature, for example . . . the spelling of *Brachycome*”. Pro-

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ponents of the spelling *Brachycome* presumably support it because it was Cassini, the author, who considered his original spelling to be erroneous. Baines (1981, p. 62) in his etymological dictionary of Australian plant genera also said that the "correct combining form for Gk brachys, short, is brachy-; followed by Gk kome, hair", and thus adopted Cassini's emendation. Botanists may have also favoured it because of its long usage. Such arguments can only hold if the name is conserved for, like Eichler (l.c.), I believe that the adoption of the spelling *Brachycome* is not in accordance with Article 73 of the International Code of Botanical Nomenclature (ICBN).

Article 73.1 of the ICBN (Voss, 1983) states that "the spelling of a name or epithet is to be retained, except for the correction of typographic or orthographic errors" and Article 73.3 states that "the liberty of correcting a name is to be used with reserve". Furthermore in Article 73.1, example 1, it is noted that the original spellings of the generic names *Mesembryanthemum* L. and *Amaranthus* L. are to be retained as they were "deliberately so spelled by Linnaeus". This is despite the fact that the spellings *Mesembrianthemum* and *Amarantus* are "philologically preferable". This agrees with the recommendations for the formation of new names today. Thus Recommendation 73 G.I states that "a compound name . . . which combines elements determined from two or more Greek or Latin words should be formed *as far as practicable*, in accordance with classical usage". Stearn (1983) has drawn attention to the names *Pachysandra* (not *Pachyandra*) and *Peliosanthes* (not *Pelianthes*), both of which are accepted despite being contrary to the ICBN recommendation that "in a true compound, a noun or adjective in a non-final position appears as a stem without case ending" (Recommendation 73 G.1a). As botanists we are presumably not meant to be masters of the classical languages, which is also reflected in the fact that generic names can be formed arbitrarily (Recommendation 75 A3).

Thus I believe that to be in accordance with the rulings of the ICBN the original spelling, *Brachyscome*, should be adopted.

Davis (1948) recognized two subgenera, namely '*Eubrachycome*' and '*Metabrachycome*'. The former contained species which possess anthers in which the connective is produced beyond the microsporangia to form a long terminal appendage. In '*Metabrachycome*' the anther connective is truncate. Of the two species described herein *B. formosa* is attributable to '*Eubrachycome*', *B. halophila* to '*Metabrachycome*'. Although the division of *Brachyscome* into two subgenera may be both natural and desirable Davis (l.c.) failed to provide a Latin description of '*Metabrachycome*' and neither it or the name '*Eubrachycome*' are validly published or established under the rules of the ICBN, a fact previously noted by Barker in Barker and Greenslade (1982).

DESCRIPTIONS

Brachyscome formosa P. S. Short, sp. nov.

Herba perennis, usque ad circa 15 cm altam, rhizomatosa, glabra. *Folia* caulina, alterna, praecipue viridia persaepe purpurascens; petiolus absens vel circa 3-25(31) mm longus, basi decurrenti; lamina plerumque circularis usque elliptica vel late obovata usque obovata, raro oblanceolata, 10-30 mm longa, (4.5)7-24 mm lata, lobis 3-7(11) interdum integris interdum 1- vel 2-dentatis. *Capitula* solitaria, terminalia, heterogama, radiata. *Involucrum* 5-8 mm diametro; bractae 14-26, imbricatae, ellipticae vel obovatae, 2.6-4.5 mm longae, 0.9-2 mm latae, herbaceae sed marginibus et apicibus scariosis. *Receptaculum* conicum, foevatum, glabrum. *Flosculi radii* feminei, 19-34; *corolla* 9.8-15.8 mm longa, 1.8-2.5 mm lata, rosea. *Flosculi disci* hermaphroditi, 40-83; *corolla* 2.5-3.6 mm longa, 0.7-1 mm diametro, flava; *antherae* 5, 1.05-1.45 mm longae, sporangiis 0.8-1.2 mm longis, appendicibus terminalibus 0.2-0.4 mm longibus. *Cypselae* homomorphae, obovatae, planae, 2-3 mm longae, 0.9-1.4 mm latae, in quoque latu tuberculatae, alis angustis integris. *Pappus* annulus ciliatus, 0.15-0.2 mm longus.

HOLOTYPE: *Short 2425*, New South Wales. c. 3.5 km north west of Coonabarabran, along road to Baradine. 31° 14' S., 149° 14' E.. Open forest of *Eucalyptus*

(White Gum, Stringybark and Box). Sparse shrub understorey of epacrid shrubs and *Daviesia latifolia*. Very sandy loam. 3.x.1984 (MEL 1529338). ISOTYPE: AD, BRI, CANB, K, NSW.

Perennial herb, to c. 15 cm high, rhizomatous, glabrous. *Leaves* cauline, alternate, mainly green but often purple, particularly on the lower surface; petiole absent or c. 3-25(31) mm long, the base decurrent; lamina usually circular to elliptic or widely obovate to obovate, rarely oblanceolate, 10-30 mm long, (4.5)7-24 mm wide, with 3-7(11) lobes, the lobes sometimes 1 or 2 toothed. *Capitula* solitary, terminal, heterogamous, radiate. *Involucre* 5-8 mm diam.; bracts 14-26, overlapping, elliptic or obovate, 2.6-4.5 mm long, 0.9-2 mm wide, mainly herbaceous but with scarious margins. *Receptacle* conical, pitted, glabrous. *Ray florets* female, 19-34; corolla 9.8-15.8 mm long, 1.8-2.6 mm wide, pink. *Disc florets* bisexual, 40-83; corolla 2.5-3.6 mm long, 0.7-1 mm diam., yellow; stamens 5; anthers 1.05-1.45 mm long, microsporangia 0.8-1.2 mm long, apical appendages 0.2-0.4 mm long, base obtuse, endothecial tissue radial, filament collar straight in outline and composed of uniform cells and basally not thicker than the filament; pollen grains (2910)3000-



Fig. 1. Leaf variation in single plants of *B. formosa* (Short 2425) and *B. halophila* (Conn 2160). Basal and near basal leaves on left to uppermost cauline leaves on right. Scales = 1 cm.

5000(5250) per floret; style branches flattened, with deltoid, papillate tips, the stigmatic papillae marginal and not reaching the apex. *Fruits (cypselas)* homomorphic, obovate, flat, 2-3 mm long, 0.9-1.4 mm broad, conspicuously tuberculate on each face, with an entire, narrow wing. *Pappus* a ciliate ring, 0.15-0.2 mm long.

Figs 1, 2.

Chromosome number: $n=9$ (*Short 2425*).

DISTRIBUTION:

All known areas are in New South Wales between c. 30° - 33° S. latitude and c. 148° - 150° E. longitude. Herbarium collections are from the vicinities of Coonabarabran, Gulgong, Mudgee and Grattai. The species also occurs in the Pilliga Scrub, having been introduced into the nursery trade from that region. I have also observed it at the base of Timor Rock and data supplied by Smith-White *et al.* (1970) suggest that it grows in the Warrumbungles National Park.

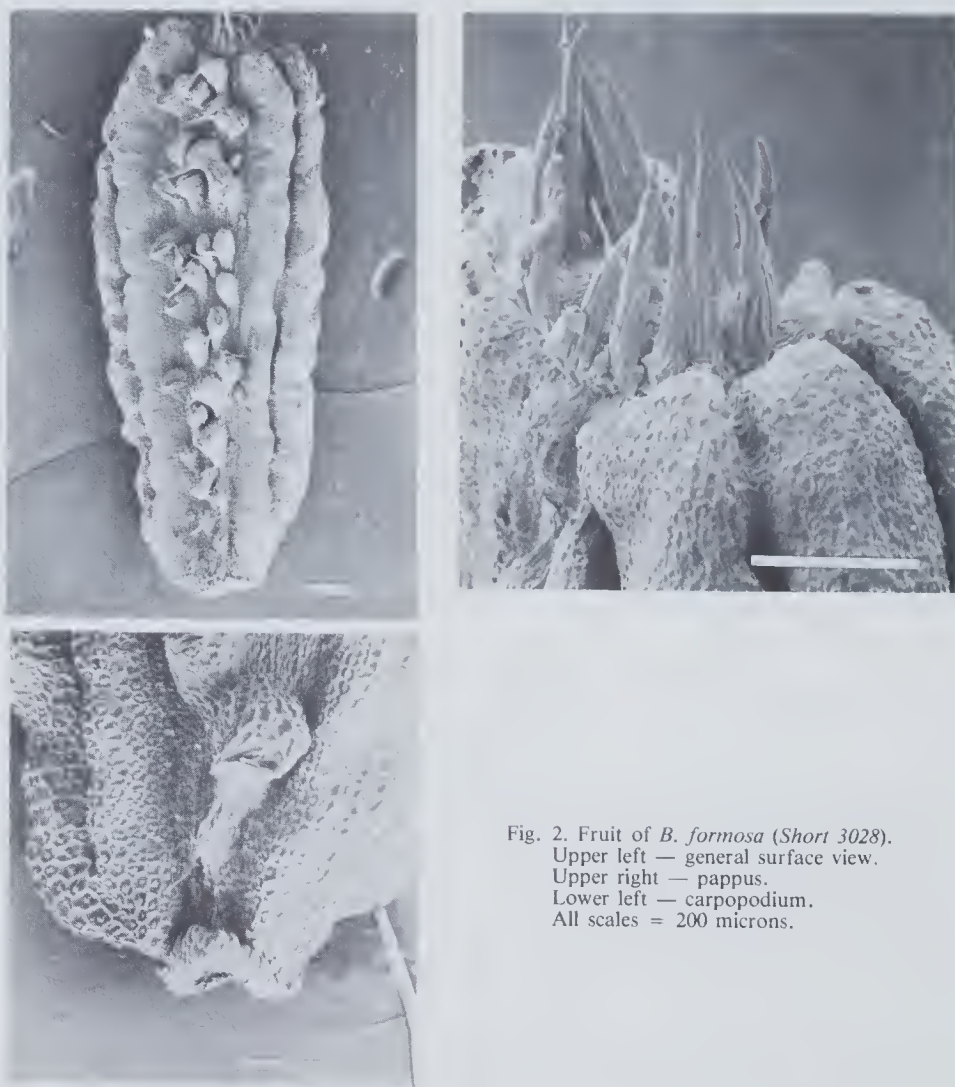


Fig. 2. Fruit of *B. formosa* (*Short 3028*).
Upper left — general surface view.
Upper right — pappus.
Lower left — carpopodium.
All scales = 200 microns.

ECOLOGY:

As well as the ecological information cited for the type locality, collectors' notes include "in grass along roadside, under *Angophora intermedia*" and "on sandstone ridges".

NOTES:

B. formosa has been recognized as a distinct taxon possibly requiring formal recognition, for a considerable time. It is evident from the label accompanying MEL 1553040, a collection gathered by Woolls and cited below, that Ferdinand Mueller felt that it was a distinct species and had considered naming it after Woolls. Davis, in 1947, determined a likely duplicate of the same collection as "probably *B. melanocarpa* Sond. & F. Muell." (Woolls, NSW 15342). Elliot and Jones (1982) referred to it as an unnamed species with affinities to *B. melanocarpa*. Although the voucher specimens have been destroyed by insects (R. C. Carolin, pers. comm. 1984) it is evident from the general description, chromosome number determination and cited distribution that Smith-White *et al.* (1970) also knew this taxon. They referred to it as species no. 5 of the superspecies *basaltica*. (The superspecies concept is that proposed by Davis in 1948).

B. formosa has also been recognized as a distinct taxon in the nursery trade, being sold in the eastern states of Australia as 'Pilliga Posy' and in Western Australia as 'Tinker Bell' (Anon. 1985). Neither name has been officially registered with the Australian Cultivar Registration Authority (G. Butler, in litt. 1985).

B. formosa is readily distinguished from *B. melanocarpa*. Unlike *B. formosa*, *B. melanocarpa* is an erect, branching herb with an indumentum of glandular and septate hairs. The leaves are commonly cuneate and the fruit is black and lacks the well-defined but narrow wing of *B. formosa*. Smith-White *et al.* (1970) recorded a haploid chromosome number of $n=6$ for *B. melanocarpa*. I have determined $n=9$ for specimens of *B. formosa* from the type locality. It is clear that despite past suggestions to the contrary the two species are not closely related. *B. formosa* appears to have close affinities with another, apparently unnamed, taxon from eastern Victoria and southern New South Wales. Collections of this taxon (e.g. Forbes 512, Walsh 1214, Walsh 1492 — all at MEL) are commonly and erroneously referred to *B. angustifolia* A. Cunn. var. *heterophylla* (Benth.) Davis and *B. petrophila* Davis.

Observations of low seed set in cultivated specimens suggest that this species is self-incompatible. That the species must or usually cross-pollinates is reflected by other attributes. Thus it is gynomonoecious, has large ray florets, produces an average of 3,840 pollen grains per disc floret and has a pollen/ovule ratio (P/O) of 3,033 (see table 1). The use of P/O values in determining plant breeding systems is well documented (e.g. Short 1981, Lawrence 1985). The P/O compares well with the values recorded by Lawrence (l.c.) for self-incompatible, gynomonoecious species of *Senecio*.

SPECIMENS EXAMINED:

New South Wales — *Althofer* 60, Gulgong, -iii.1946 (NSW); *Short* 3028, 3.5 km NW. of Coonabarabran along road to Baradine, 1.xi.1986 (MEL); *Tindale & Ingram s.n.*, Bathurst-Grattai road, 18.x.1953 (NSW 25648); *Woolls s.n.*, summit of ranges near Mudgee, -ix.1872 (MEL 1553038); *Woolls s.n.*, Mudgee, s. dat. (NSW 15342); *Woolls s.n.*, top of high hills near Mudgee, s. dat. (MEL 1553039); *Woolls s.n.*, high mountains near Mudgee, s. dat. (MEL 1553040).

***Brachyscome halophila* P.S. Short, sp. nov.**

Herba annua, 10-33 cm alta, pilis sparsis. *Folia* basilaria et caulina, super alterna sed ad basem opposita, integra et linearia, c.1-4 cm longa, 0.1-0.2 cm lata, vel pinnatisecta, (1)2-8(c.12) cm longa, (0.5)1-4(4.2) cm lata, semper viridia, basibus decurrentibus, pilis septatis. *Capitula* solitaria, terminalia, heterogama, radiata. *Involucrum* c.7-8 mm diametro; bractee 8-14, imbricatae, ellipticae vel obovatae, 2.7-5.2 mm longae, 1.1-2.8 mm latae, herbaceae sed marginibus et apicibus scariosis. *Receptaculum* conicum, foevatum, glabrum. *Flosculi* radii

feminei, 9-13; corolla (5.1)7-10.5(11.2) mm longa, (1.6)2-3.8(4.1) mm lata, alba vel pallens malvina vel purpurea. *Flosculi disci* hermaphroditi, 40-118; corolla (1.7)2-2.8(3.2) mm longa, 0.6-1.2 mm diametro, lutea; antherae 5, 0.75-0.96 mm longae, connectivis truncatis. *Cypselae* homomorphae, 2-2.6 mm longae, tuberculatae, brunneae; paginae laterales humeratae, per cristas duas; paginae abaxiales adaxialesque ala, integra vel 3-10 lobata, lobis pilis; carpodium carens. *Pappus* carens.

HOLOTYPE: *Conn 2160*, Western Australia, c. 9.6 km south of Three Springs on road to Carnamah. 29° 36' S., 115° 49' E.. Occurring on small sand ridge in middle of dry salt lake. Associated species include *Scaevola spinescens*, *Cassia eremophila* and *Bromus rubens*. 15.ix.1985 (MEL 1546972). **ISOTYPE:** AD, CANB, K, PERTH.

Annual herb, 10-33 cm high, sparsely hairy. *Leaves* basal and cauline, mainly alternate but the lowest ones opposite, entire and linear, c. 1-4 cm long, 0.1-0.2 cm wide, or pinnatisect, (1)2-8(c. 12) cm long, (0.5)1-4(4.2) cm wide, all leaves green, basally decurrent and with scattered septate hairs. *Capitula* solitary, terminal, heterogamous, radiate. *Involucre* c. 7-8 mm diam.; bracts 8-14, overlapping, elliptic or obovate, 2.7-5.2 mm long, 1.1-2.8 mm wide, mainly herbaceous but with scarious apices and margins. *Receptacle* conical, pitted, glabrous. *Ray florets* female, 9-13;

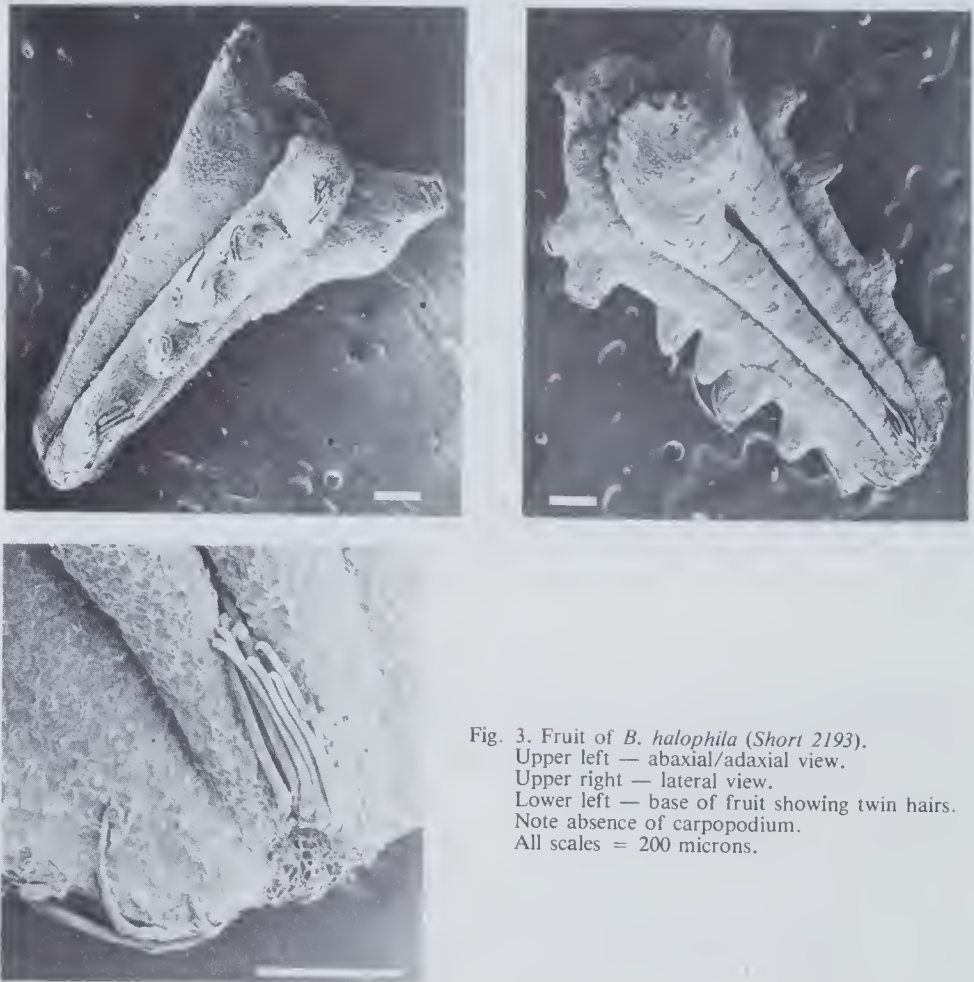


Fig. 3. Fruit of *B. halophila* (Short 2193).
Upper left — abaxial/adaxial view.
Upper right — lateral view.
Lower left — base of fruit showing twin hairs.
Note absence of carpodium.
All scales = 200 microns.

corolla (5.1)7-10.5(11.2) mm long, (1.6)2-3.8(4.1) mm wide, white or pale mauve or purple except for white at base. *Disc florets* bisexual, 40-118, corolla (1.7)2-2.8(3.2) mm long, 0.6-1.2 mm diam., usually yellow but young florets sometimes tinged red; stamens 5; anthers 0.75-0.96 mm long, connective truncate, endothelial tissue radial; filament collar straight in outline and composed of uniform cells and basally not thicker than the filament. Style branches with the tips \pm lanceolate and papillate, the stigmatic papillae marginal and not reaching the apex. *Fruits* (*cypselas*) homomorphic, 2-2.6 mm long, minutely tuberculate, brown to brown-black; lateral surfaces with two ridges forming an apical shoulder; abaxial and adaxial surfaces of an entire or 3-10 lobed wing, the lobes with one to several curled, twin hairs; carpopodium absent. *Pappus* absent. Figs 1, 3.

Chromosome number: $n=9$ (*Short 2800*).

DISTRIBUTION:

Occurs in Western Australia between latitudes 28°-30° S. and longitudes 115°-116° E. Known only from the type locality and from c. 10 kilometres west of Pindar.

ECOLOGY:

Brachyscome halophila apparently grows exclusively on sand ridges in or on the edge of saline depressions. As well as the ecological information given for the holotype, collectors' notes include: "Growing amongst *Halosarcia* & *Maireana* on deep sand", "Very sandy loam amongst samphire & *Aizoon*" and "In sand amongst *Acacia* shrubs and *Stipa*".

NOTES

The collection *Short 2877*, from near Pindar, differs from typical *B. halophila* in floret colour. The ray florets are bright purple with white at the base and in young disc florets the lobes are often tinged red. Specimens from the type locality have only white to mauve ray florets and yellow disc florets. The phenotypic differences may be due to variation in environmental conditions. However *B. halophila* is apparently confined to the margins of salt lakes and as previously noted (*Short 1981, 1986*) the salt lakes of Western Australia have undoubtedly been reservoirs of speciation. This is a result of the physical isolation of populations in different lake systems and drainage divisions (*Bettenay & Mulcahy 1972; Mulcahy & Bettenay 1972*). The type locality of *B. halophila*, on the eastern edge of Yarra Yarra Lakes, is in the South West Drainage Division. Population *Short 2877* is approximately 120 kilometres further north and is in the Murchison Drainage Division. Hence it seems that the phenotypic differences observed between the populations of *B. halophila* may be genetically determined.

The chromosome number determination of $n=9$ (*Short 2800*) for *B. halophila* is consistent with determinations for other species referred by *Davis (1948)* to subgenus '*Metabrachycome*'. *Carter (1978)*, in determining chromosome counts for 12 of the 17 species recognized in this group found that all had a base number of $x=9$.

Fruit morphology suggests that *B. halophila* has affinities with *B. cheilocarpa* F. Muell., *B. ciliocarpa* W. Fitzg. and *B. oncocarpa* Diels, i.e. it is referable to the superspecies *ciliocarpa* recognized by *Davis (l.c.)*. (Examination of type specimens at MEL suggests that *B. ciliocarpa* and *B. oncocarpa* will prove to be conspecific).

The reference to the abaxial, adaxial and lateral surfaces of the fruit refers to the orientation of the fruit relative to the central axis of the receptacle. Hence the usually divided wings (deemed to be on the adaxial and abaxial surfaces of the fruit) point towards and away from the centre of the receptacle. The shoulders of the fruit (deemed to be on the lateral surfaces of the fruit) are more or less orientated parallel to the circumference of the receptacle.

Attributes pertaining to the reproductive biology of *B. halophila* are summarized in table 1. The species, like *B. formosa*, is gynomonoeious, has conspicuous ray florets and a high P/O ratio. The P/O value also compares well with those recorded by Lawrence (1985) for self-incompatible, gynomonoeious species of *Senecio* with showy ray florets. The higher P/O value in *B. halophila* compared to *B. formosa* is partly due to the production of slightly more pollen grains per floret but mainly reflects the fact that the average percentage of ray florets per capitulum is approximately half that found in *B. formosa*. The rhizomatous habit of *B. formosa* and hence its potential for asexual reproduction may also explain in part why the P/O value for that species is lower than in *B. halophila*. In terms of resource allocation it is also not surprising that it is the longer-lived perennial, not the annual, species which produces the most ray florets per capitulum.

Table 1. Attributes pertaining to the reproductive biology of *B. formosa* and *B. halophila*. Figures are based on *Short 2425* and *Conn 2160* respectively. Data is from fifteen individuals per population. P/Os and anther measurements have been determined following the methods outlined in Short (1981, 1985).

Character	<i>B. formosa</i>	<i>B. halophila</i>
Longevity	perennial (rhizomate)	annual
Total number of florets per capitulum	62-113 \bar{x} = 78.9 S.D. = 14.2 S.E. = 3.67	53-129 \bar{x} = 75.2 S.D. = 20.34 S.E. = 5.25
Number of ray florets per capitulum	19-34 \bar{x} = 24.2 S.D. = 4.09 S.E. = 1.05	9-13 \bar{x} = 11.2 S.D. = 1.32 S.E. = 0.34
Number of disc florets per capitulum	40-83 \bar{x} = 56.6 S.D. = 11.8 S.E. = 3.06	40-118 \bar{x} = 64 S.D. = 20.3 S.E. = 5.25
Average % of ray florets per capitulum	31	15.8
Length of ray florets (mm)	9.8-15.8 \bar{x} = 12.08 S.D. = 1.45 S.E. = 0.37	5.1-11.2 \bar{x} = 8.51 S.D. = 1.39 S.E. = 0.35
Length of anther (mm)	1.05-1.5 \bar{x} = 1.3 S.D. = 0.12 S.E. = 0.031	0.75-0.98 \bar{x} = 0.84 S.D. = 0.68 S.E. = 0.017
Length of microsporangia (mm)	0.8-1.2 \bar{x} = 1.01 S.D. = 0.099 S.E. = 0.025	equivalent to anther length
Length of terminal anther appendage	0.25-0.4 \bar{x} = 0.31 S.D. = 0.06 S.E. = 0.015	absent
Pollen grains per floret	2910-5250 \bar{x} = 3840 S.D. = 656.9 S.E. = 169.6	2528-5988 \bar{x} = 4193 S.D. = 1081.5 S.E. = 279.2
Pollen/ovule ratio	3033	3530

SPECIMENS EXAMINED:

Western Australia — Chinnock 3718, 12.7 km from Carnamah on Three Springs road, 14.viii.1977 (AD, MEL); Short 2193, c. 13 km N. of Carnamah, 23.x.1983 (MEL); Short 2800, c. 10 km S. of Three Springs, 9.ix.1986 (AD, MEL, NSW, PERTH); Short 2877, c. 10 km W. of Pindar, 13.ix.1986 (AD, MEL, NSW, PERTH).

ACKNOWLEDGEMENTS

I thank Dr W. R. Barker for checking the Latin descriptions and for general comments on the manuscript, Dr B. J. Conn for his collection of *B. halophila*, Mr G. Butler for information pertaining to the cultivar names and Miss K. E. Wilson for preparing illustrations and assisting in the compilation of descriptive data.

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Manuscript received 25 February 1987.

THREE NEW SPECIES OF PHEBALIUM Vent. SECT. ERIOSTEMOIDES
Endl. (RUTACEAE) FROM SOUTH-EASTERN AUSTRALIA

by

NEVILLE G. WALSH* AND DAVID E. ALBRECHT*

ABSTRACT

Walsh, Neville G. & Albrecht, David E. Three new species of *Phebalium* Vent. sect. *Eriostemoides* Endl. (Rutaceae) from south-eastern Australia. *Muelleria* 6(6): 399-409 (1988). — *Phebalium frondosum* and *P. wilsonii*, both from Victoria, and *P. rhytidophyllum* from New South Wales, are described as new species. The habitat, distribution, relationships and conservation status of each are discussed and illustrations provided.

TAXONOMY

Phebalium wilsonii N. G. Walsh & D. E. Albrecht, sp. nov.

Frutex vel arbor parva ad 10 m altus. *Ramuli* teres tuberculati lepidoti. *Folia* anguste elliptica vel lanceolata 30-80 mm longa, 5-15 mm lata, apice obtusa vel acuta, supra nitida, infra dense argenteo-lepidota. *Flores* 2-9 in cymis axillaribus. *Sepala* lepidota. *Petala* extra lepidota. *Filamenta* prope bases sparsim stellato-pilosa. *Ovarium* lepidotum. *Stylus* prope basem sparsim stellato-pilosus.

Shrub or small tree to 10 m high. *Branchlets* terete, densely lepidote, glandular-verrucose. *Leaves* alternate. *Petiole* 1-7 mm long. *Lamina* narrowly elliptic to lanceolate, mostly 30-80 mm long, 5-15 mm wide, chartaceous; apex obtuse to acute; margin plane to slightly recurved; upper surface smooth and glossy, glabrous except for scattered scales along the slightly impressed midrib, becoming slightly wrinkled and the glands raised when dry; lower surface densely silvery-lepidote, the midvein apparent to the apex, the lateral nerves not visible. *Inflorescences* axillary, each a 2- to 9-flowered cyme up to ½ the length of the subtending leaf, sometimes forming a slender, leafy, apparent panicle on a short, indeterminate, lateral branchlet. *Peduncle* mostly 5-12 mm long. *Pedice* 2-8 mm long, densely lepidote. *Floral bracts* 1-3, elliptic, 5-8 mm long, leaf-like; margins incurved. *Bracteoles* 0-2, minute, caducous. *Sepals* united at extreme base, triangular, 0.8-1.1 mm long, lepidote on outer surface. *Petals* elliptic, 3.5-5 mm long, white, lepidote on outer surface. *Stamens* equal to or slightly shorter than petals; filaments slightly flattened, tapering distally, 3-3.5 mm long, bearing marginal stellate trichomes near the base; anthers broadly elliptic in outline, 0.8-1 mm long. *Disc* c. 0.3 mm long, glabrous, slightly narrower than ovary. *Ovary* more or less hemispherical, c. 1 mm long, silvery-lepidote. *Style* slender, terete, c. 2 mm long, glabrous or sparsely stellate-hairy near the base. *Cocci* slightly spreading, obliquely ovoid, somewhat flattened, pointed at the apex, c. 4 mm long, becoming glabrous or retaining a few scales at maturity. *Seed* flattened-ellipsoid to sub-reniform, probably c. 3 mm long but no mature material seen. Figs 1, 2.

TYPE COLLECTION:

Victoria — Central Highlands, M.M.B.W. O'Shannessy Catchment. At crossing of Deep Ck by track #5; 7.5 km due south from Mt Grant, alt. 720 m, 37° 36' 20" S., 145° 48' 50" E., 6.xi.1985, N. G. Walsh 1494 (Holotype: MEL 1540265. Isotypes: AD, BRI, CBG, HO, K, MEL 687868, NSW, PERTH).

SELECTED SPECIMENS EXAMINED:

Victoria — Woods Point, Goulbourne [sic] R., 1892, W. F. Gates (MEL 4350). Type locality (see above): 27.iv.1979, N. G. Walsh s.n. (MEL 596008); 22.x.1980, N. G. Walsh 561 (MEL 596143) and 22.i.1987, N. G. Walsh 1695 (MEL 1553276).

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Fig. 1. *Phebalium wilsonii*. a — Flowering branch, x 2/3. b — Flower, x 4. c — Fruit with three near-mature cocci and two aborted cocci, x 4.

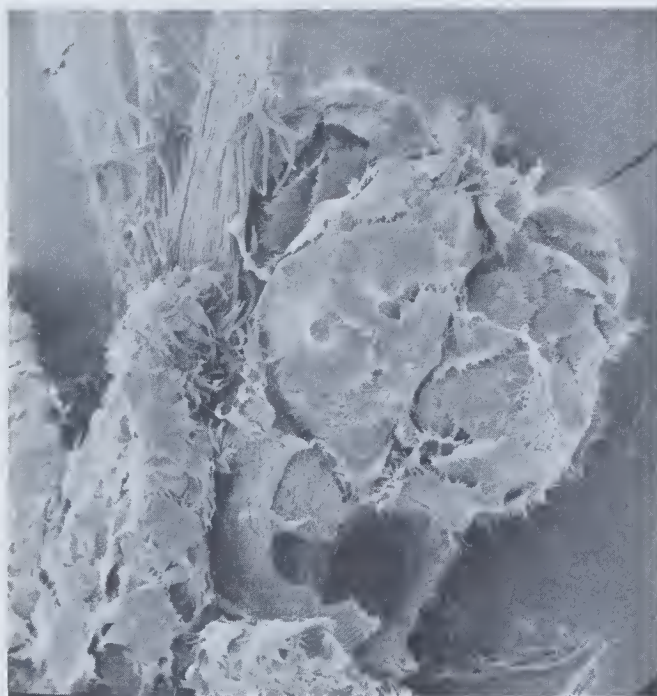


Fig. 2. *Phebalium wilsonii*. SEM microphotograph showing lepidote ovary, ruptured disc (lower centre), lepidote sepal (lower to centre left) and bases of staminal filaments with stellate trichomes (centre to upper left), x 48.

DISTRIBUTION (Fig. 7) AND CONSERVATION STATUS:

Known with certainty only from the type locality. The collection by Gates from Woods Point, c. 35 km east of the type locality, indicates that the species may be more widespread but the lack of recent collections from Woods Point and the alteration of the area near there since 1892 by wildfire, settlement and gold prospecting, suggests that *P. wilsonii* may no longer occur at that locality. About 500 plants (including numerous seedlings) were observed at the type locality. The species conservation status is assessed at 2R (Briggs & Leigh, in press), that is, the species is known from a geographic range of less than 100 km and is rare. The species is not known from a conservation reserve although current catchment policy of the Melbourne and Metropolitan Board of Works ensures the species' survival at least in the short term.

HABITAT:

Montane, (alt. 720 m), occurring within *Eucalyptus regnans* tall open forest merging to *Nothofagus cunninghamii* cool temperate rainforest. Soils are deep mountain loams derived from granite. *P. wilsonii* appears to be an ecotonal species and probably regenerates following disturbance, as evidenced by its successful establishment along track margins in the type area.

DISCUSSION:

P. wilsonii is unique in the section *Eriostemoides* in possessing the following combination of characters: very glossy, narrowly elliptic or lanceolate leaves (30–80 mm long), tuberculate branchlets, and lepidote ovary and petals. It bears a close superficial similarity to *P. squameum* (Labill.) Engl. subsp. *squameum*, a shrub or small tree from the Otway Ranges in Victoria, from Tasmania and from near-coastal forests of central New South Wales to southern Queensland. However *P.*

squameum subsp. *squameum* has non-tuberculate branchlets, and glabrous petals and ovary.

This species is the taxon identified by P. G. Wilson in his revision of *Phebalium* (Wilson, 1970) as *Phebalium* aff. *squameum*, but not formally named therein.

The species is named after Mr Paul G. Wilson in respect of his work on the Australian flora (particularly, in this case, the Rutaceae) and in recognition of his English description of the species, on which the present account is largely based.

***Phebalium rhytidophyllum* D. E. Albrecht & N. G. Walsh, sp. nov.**

Frutex ad 3 m altus. *Ramuli* angulati glandulo-verrucosi lepidoti. *Folia* obovata, 3-12 mm longa, 2.5-9.5 mm lata, apice obcordata, supra glanduloso-punctata, nitida, rugata ubi siccata, infra dense lepidota. *Flores* axillares cymis unifloris raro bifloris vel trifloris. *Sepala* glabra raro sparsim lepidota. *Petala* glabra. *Filamenta* glabra. *Ovarium* glabrum.

Rather densely foliose shrub to 3 m high. *Bark* ultimately grey-brown, smooth. *Branchlets* angular, densely coppery-lepidote, sparsely to densely glandular-verrucose, becoming glabrous and terete with age. *Leaves* alternate. *Petioles* 1-2 mm long. *Lamina* obovate, 3.0-12.0 mm long, 2.5-9.5 mm wide, coriaceous; apex obcordate, cleft to about $\frac{1}{8}$ leaf length; margins plane to recurved; upper surface glabrous, glossy, glandular-punctate, becoming prominently wrinkled in dried material due to contraction of mesophyll tissue between glands; lower surface densely silvery-to pale coppery-lepidote when young, becoming silvery-lepidote when mature, the midvein scarcely apparent and the lateral veins not visible. *Inflorescences* axillary, each a 1 (rarely to 3)-flowered cyme; peduncle and pedicel angular to flattened, coppery-lepidote, together 2-7 mm long in 1-flowered inflorescences or peduncle 2-6 mm long and pedicel 1-4 mm long in 2- or 3-flowered cymes. *Floral bracts* 1-4, oblong, 1-2 mm long, copper-lepidote on exterior surface, strongly incurved. *Bracteoles* 0-2, smaller and narrower than the bracts, lepidote, concave. *Sepals* slightly fused at base, deltoid, 0.5-1.2 mm long, glabrous or rarely with a few scales toward the base on the outer surface, white, glandular-punctate; apex often inflexed. *Petals* elliptic, 3.5-4.5 mm long, white, glandular-punctate, glabrous. *Stamens* virtually equal in length to petals; filaments slightly flattened, tapering distally, glabrous, 3-3.5 mm long; anthers ovoid to suborbicular, slightly retuse, 0.7-0.9 mm long. *Disc* 0.2-0.4 mm long, equal in width to ovary. *Ovary* hemispherical to broadly conical, c. 1 mm long, glabrous, glandular. *Style* slender, terete, c. 2.5 mm long, glabrous. *Cocci* slightly spreading at maturity, c. 3-3.2 mm long, quadrate, minutely apiculate on the outer angle, glabrous, glandular-verrucose, reticulate. *Seed* oblong to sub-reniform, c. 1.8-2 mm long, very dark brown to black. Figs 3, 4.

TYPE COLLECTION:

New South Wales — Southern tablelands/south coast, Rocky outcrop 1.0 km NW. of Wog Wog Mountain trig, Nalbaugh National Park, 37° 05' 15" S., 149° 25' 15" E., 18.xii.1985, D. E. Albrecht 2333. (Holotype: MEL 1553279. Isotypes: K, NSW, PERTH).

SELECTED SPECIMENS EXAMINED:

New South Wales — White Rock Plateau, between Mt Wog Wog and White Rocks, 37° 05' 00" S., 149° 24' 30" E., 26.iii.1985, D. E. Albrecht 1658 (MEL 1553280). 1.0 km NW. of Wog Wog Mountain trig, 37° 05' 15" S., 149° 25' 15" E., 18.xii.1985, H. Thompson 718 (CBG 8506152). 2.3 km NW. of Wog Wog Mountain trig, 37° 04' 50" S., 149° 24' 40" E., 22.ii.1987, D. E. Albrecht 3064 & P. Gilmour (MEL 1553281). 2.9 km NW. of Wog Wog Mountain trig, 37° 04' 40" S., 149° 24' 30" E., 22.ii.1987, D. E. Albrecht 3065 & P. Gilmour (MEL 1553282).

DISTRIBUTION (Fig. 7) AND CONSERVATION STATUS:

Known only from four populations on the plateau between Wog Wog and White Rock Mountains, approximately 25 km south-east of Bombala in far south-eastern New South Wales. All populations are situated within Nalbaugh National

Park. However, the populations are small and the total number of individuals known would not exceed 200. The conservation status is assessed at 2VCit (Briggs & Leigh, in press), that is, the species is known from a geographical range of less than 100 km, it is vulnerable due to the low total known population, and the total population is contained within a biological reserve. The plateau supports highly



Fig. 3. *Phebalium rhytidophyllum*. a — Flowering branch, x 2/3. b — Flower, x 4. c — Fruit, x 4.



Fig. 4. *Phebalium rhytidophyllum*. SEM microphotograph showing glabrous ovary (right of centre), glabrous sepals (centre) and glabrous bases of staminal filaments (centre to right), x 35.

disjunct populations of several rare species, e.g. *Acacia costiniana* Tindale and *Boronia deanei* Maiden & Betche, and it is possible that disjunct populations of *P. rhytidophyllum* will also be discovered further north in suitable environments.

HABITAT:

The plateau experiences a cool, moist climate with frequent mists and occasional snowfalls during winter. The predominant rock type is granite which outcrops in a number of localities. Where there is sufficient soil development to support open forest, *P. rhytidophyllum* grows under a canopy dominated by *Eucalyptus fraxinoides* or *E. obliqua*. More commonly however, it occurs in mixed species shrublands with *Leptospermum scoparium*, *Epacris robusta*, *Leucopogon gelidus* and *Hakea dactyloides* in sheltered aspects on large rock expanses. *P. rhytidophyllum* also extends to a limited degree into drier, more exposed sites on the northern edge of the plateau where *Eucalyptus sieberi*, *Kunzea ambigua* and *Hakea dactyloides* are common species. Its known altitudinal range is 1025-1070 metres.

DISCUSSION:

P. rhytidophyllum is unique in the section *Eriostemoides* in possessing the following combination of characters: the leaves are obovate, relatively small (to 12 mm long), have distinctive obcordate apices and become strongly wrinkled above when dry. The bracts are short (to 2 mm long) and narrow, the inflorescence is generally a 1- (rarely 2- or 3-) flowered cyme and the ovary is glabrous.

P. rhytidophyllum appears to be most closely related to *P. squameum*, which was divided into three subspecies by Wilson (1970). Of the three infraspecific taxa, subsp. *coriaceum* and subsp. *retusum* (between which the distinctions are not always clear) are closest to *P. rhytidophyllum* but are distinguished from that species in having ovate, elliptic or oblong leaves (mostly > 15 mm long) with obtuse to retuse

apices, longer (> 2 mm long) and broader bracts and an inflorescence which is generally a 2- to 6- (rarely 1-) flowered cyme.

P. frondosum (described herein) bears a superficial resemblance to *P. rhytidophyllum* but it differs clearly from that species in several characteristics including the thinner, ovate leaves with obtuse or slightly emarginate apices, the non glandular-verruose stems, the larger (> 2 mm long) bracts and the ovary which is endowed with stellate trichomes.

The specific epithet refers to the very prominent wrinkling of the adaxial leaf surface which is conspicuous in dried material.

***Phebalium frondosum* N. G. Walsh & D. E. Albrecht, sp. nov.**

Frutex ad 7 m altus. *Ramuli* valde angulati, lepidoti. *Folia* complanata, ovata, 8-23 mm longa, 6-15 mm lata, apice obtusa vel emarginata, infra dense argenteo-lepidota. *Flores* axillares cymis unifloris raro bifloris vel trifloris. *Sepala* dense lepidota. *Petala* glabra. *Filamenta* prope bases stellato-pilosa. *Ovarium* prope basim lepidotum, ad et prope summum stellato-pilosum.

Shrub to c. 7 m high, conical, densely foliose. *Branches* and branchlets produced almost horizontally or slightly down-arched. *Branchlets* strongly angled and densely lepidote. *Leaves* spreading horizontally from branches. *Petiole* 2-5 mm long. *Lamina* ovate, mostly 8-23 mm long, 6-15 mm wide, chartaceous; apex obtuse or slightly emarginate; margin plane, becoming recurved on drying; upper surface glabrous, glandular, the glands becoming prominently raised and the lamina sometimes obscurely wrinkled on drying; lower surface densely silvery-lepidote, the midvein barely apparent and lateral veins not visible. *Inflorescences* axillary, each a 1 (rarely to 3)-flowered cyme; peduncle and pedicel decurved, strongly angular, lepidote, together 6-12 mm long in 1-flowered inflorescences, or peduncle 4-9 mm long and pedicel 1-4 mm long in 2- or 3-flowered cymes. *Floral bracts* oblong to obovate, 2-5 mm long, strongly incurved and lepidote on abaxial surface. *Bracteoles* 0-2, subopposite, minute, caducous, inserted immediately below the calyx. *Sepals* shortly united near base, triangular, 1.5-2.5 mm long, closely lepidote on outer surface. *Petals* elliptic, 4-6 mm long, glabrous, sparsely glandular about the centre. *Stamens* slightly shorter than petals; filaments slightly flattened, tapering distally, 3.5-4.5 mm long, bearing marginal trichomes near the base; anthers broadly elliptic, 0.8-0.9 mm long. *Disc* c. 0.7 mm long, equal in width to ovary. *Ovary* hemispherical, c. 1 mm long, densely covered with long-fringed scales near the base grading to tufted stellate trichomes toward and on the apex. *Style* slender, terete, c. 3 mm long, glabrous. *Cocci* slightly spreading at maturity, obliquely obovoid, slightly flattened, c. 4 mm long, bluntly pointed at outer angle, becoming glabrous or retaining a few trichomes within the dorsal groove, glandular, pustulose. *Seed* oblong, slightly keeled dorsally, c. 3 mm long, black. Figs 5, 6.

TYPE COLLECTION:

Victoria — Carpark below summit of Mt Elizabeth no. 2, Mt Elizabeth State Forest, 37° 29' 40" S., 147° 55' 55" E., alt. 860 m, 14.x.1986, D. E. Albrecht 2875 (Holotype: MEL 1553277. Isotypes: CBG, K, NSW).

SELECTED SPECIMENS EXAMINED:

Victoria — All from type locality: 8.ii.1964, L. Banfield s.n. (MEL 502291); 16.xi.1968, J. H. Willis s.n. (MEL 502291); 28.ii.1971, A. C. Beaglehole 37128 (MEL 610751) and 26.i.1987, N. G. Walsh 1697 (MEL 1553278).

DISTRIBUTION (Fig. 7) AND CONSERVATION STATUS:

Known only from the summit area and upper southern slopes of Mt Elizabeth and probably endemic there as it has not been located in surrounding areas in several botanical studies (e.g. Forbes et al., 1981). The Mt Elizabeth summit area comprises a unique combination of altitude, geology and topography (McRae-



Fig. 5. *Phebalium frondosum*. a — Flowering branch, x 2/3. b — Flower, x 4. c — Fruit, x 4.

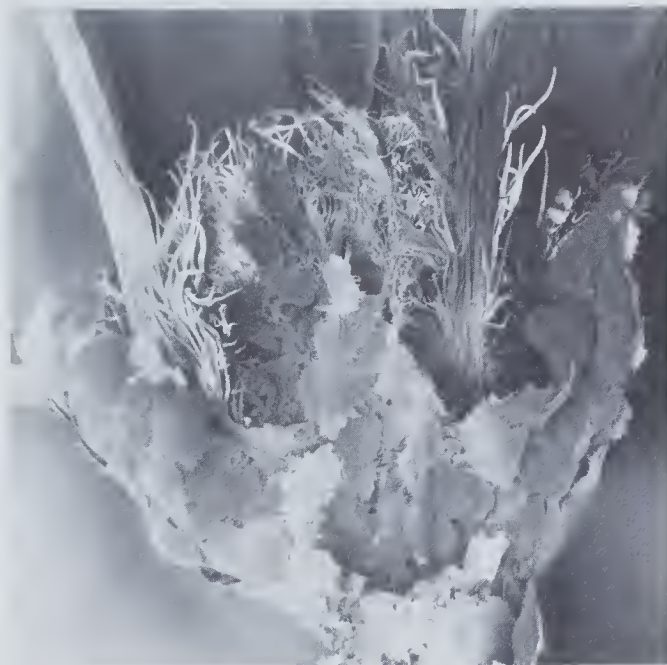


Fig. 6. *Phebalium frondosum*. SEM microphotograph showing ovary covered by fringed scales and stellate trichomes (centre), lepidote sepals (lower) and bases of staminal filaments with stellate trichomes, x 21.

Williams et al., 1981) and several rare or restricted species occur thereon, e.g. *Hibbertia hermanniifolia*, *Hovea* sp. aff. *purpurea*, *Prostanthera walteri* and *Tetradlea subaphylla*. The conservation status of *P. frondosum* is assessed as 2RCa (Briggs & Leigh, in press), that is, the species has a known geographic range of less than 100 km, is rare and is represented in a reserve where reservation is considered to be adequate to ensure the species' survival.

HABITAT:

Montane (alt. c. 820-940 m), occurring in *Eucalyptus obliqua*, *E. baxteri*, *E. sieberi* tall open forest below the summit and in mixed species shrubland dominated by *Kunzea ericoides*, *Leptospermum brevipes* and *Callistemon pallidus* on and near the rocky summit. Soils are loamy and shallow below the summit or skeletal at the summit, derived primarily from granodiorite or rhyolite parent material.

DISCUSSION:

This species is unique in the section *Eriostemoides* in possessing stellate trichomes on the ovary. The pendent, single-flowered cymes and the branching habit of the plant are also distinctive features. In addition, the odour from crushed leaves of *P. frondosum* is markedly dissimilar from other members of the section *Eriostemoides*, suggesting phytochemical analysis of the section may yield valuable comparative information.

Material of this species, first collected in 1964, was apparently not seen by P. G. Wilson prior to publication of his revision of *Phebalium* (Wilson, 1970). It was later incorrectly ascribed by authors (e.g. Willis, 1973; Costermans, 1981) to *Phebalium squameum* (Labill.) Engl. subsp. *coriaceum* P. G. Wilson, a montane to subalpine shrub barely 1.5 metres high and confined to only two localities, both

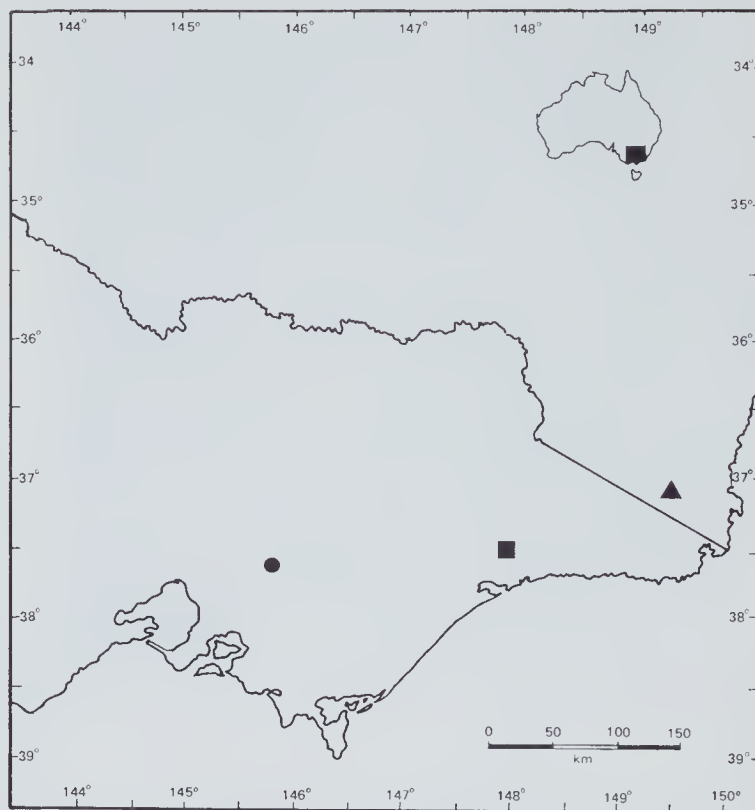


Fig. 7. Distribution of *P. wilsonii* — ●, *P. rhytidophyllum* — ▲ and *P. frondosum* — ■.

in eastern Victoria (see discussion under *P. rhytidophyllum* giving other characteristics of *P. squameum* subsp. *coriaceum*).

The specific epithet refers to the leafy habit of the plant and, in the common usage of "frond", alludes to the attractive, layered, frond-like appearance of the branches.

ACKNOWLEDGEMENTS

We are grateful to Mr C. Currie of the Melbourne and Metropolitan Board of Works for arranging access to the O'Shannessy catchment on several occasions to enable a representative suite of material of *P. wilsonii* to be obtained, to Ms H. Thompson (CBG) for providing material of *P. rhytidophyllum*, to Mr F. Daniels (La Trobe University Botany Department) for access to and assistance with operating the Department's scanning electron microscope, to Miss A. M. Podwyszynski for the illustrations of the species, to Dr P. K. Gullan for assistance with word-processing facilities and to Mr Paul G. Wilson and our colleagues Mrs M. G. Corrick and Dr J. H. Ross for their encouragement in the instigation and completion of this paper.

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Manuscript received 13 March 1987.

NOMENCLATURAL NOTES ON CALLISTEMON R. Br. (MYRTACEAE)

by

P. F. LUMLEY and R. D. SPENCER*

ABSTRACT

Lumley, P. F. & Spencer, R. D. Nomenclatural notes on *Callistemon* R. Br. (Myrtaceae). *Muelleria* 6(6): 411-415 (1988). — The name *Callistemon rugulosus* (D. F. K. Schldl. ex Link) DC. is adopted for the species which has been known incorrectly as *Callistemon macropunctatus* (Dum.-Cours.) A. B. Court, a name whose basionym *Metrosideros macropunctata* Dum.-Cours. is of uncertain application. The name *Callistemon glaucus* (Bonpl.) Sweet is taken up for the species to which the name *Callistemon speciosus* (Sims) Sweet has been misapplied. Plants previously referred to *Callistemon paludosus* F. Muell. are now referred to *Callistemon sieberi* DC. with which *Callistemon salignus* (Sm.) Sweet var. *australis* Benth. *sensu stricto* is synonymous. The name *Callistemon pityoides* F. Muell. is taken up to replace the previously misapplied name *C. sieberi* DC..

INTRODUCTION

This paper is presented ahead of a revision of the genus *Callistemon* in order to justify names used by Spencer and Lumley (1986) in edition 4, part 2 of 'Flora of South Australia'.

NOMENCLATURE

Callistemon rugulosus (D. F. K. Schldl. ex Link) DC., Prodr. 3: 223 (1828)., as '*C. rugulosum*'. — *Metrosideros rugulosus* D. F. K. Schldl., Enum. pl. hort. berol. supp. 31 (July-Dec. 1814), as '*M. rugulosa*', nomen nudum. — *M. rugulosus* D. F. K. Schldl. ex Link, Enum. hort. berol. alt. 2: 27 (1822), as '*M. rugulosum*'. NEOTYPE (here selected): "Jard. de Berlin" 1826, *Otto s.n.* (G-DC!).

Metrosideros scabra Colla, Hortus ripul. 91 (1824). Lectotype (here selected): "ex horto 1831" (TO 2288!).

[*Callistemon macropunctatus* auctt. non (Dum. Cours.) A. B. Court, Victorian Naturalist 73: 175 (1957).]

The combination *Callistemon rugulosus* (Willd.) DC appears to be illegitimate being based on the invalid publication of *Metrosideros rugulosa* in D. F. K. Schlechtendal's supplement (July-Dec. 1814) to Willdenow's *Enumeratio plantarum horti regii botanici berlinensis*. Realising this, A. B. Court (*loc. cit.*) published the combination *Callistemon macropunctatus* (Dum.-Cours.) A. B. Court based on the next available name for this taxon, *Metrosideros macropunctata* Dum.-Cours., Bot. cult. edn 2, 7: 277 (June 1814), a synonym cited by de Candolle (1828) which has priority over *M. rugulosa* Schldl.

Du Mont de Courset's description was of young, non-flowering, cultivated material; the leaf dimensions, 7 lignes [14mm] by 1 ligne [2mm], fall well outside the normal range for *Callistemon macropunctatus* as now understood. We can find no illustration of *Metrosideros macropunctata* nor any herbarium specimen so labelled in any of the collections we have examined. The description cannot be satisfactorily applied to any species of *Callistemon*; consequently we regard this name as of uncertain application.

The next available names for this species are *Metrosideros rugulosa* D. F. K. Schldl. ex Link (1822) and *Metrosideros scabra* Colla (1824).

Since de Candolle did not explicitly cite *Metrosideros rugulosa* D. F. K. Schldl. ex Link (or Willd. ex Link) 1822 as the basionym for his combination *Callistemon rugulosus* and since *C. rugulosus* (D. F. K. Schldl.) DC. (1828) would be illegitimate as it would be based on the invalid *M. rugulosa* D. F. K. Schldl. (1814), there is

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a strong case for regarding the correct combination to be *Callistemon scaber* based on *Metrosideros scabra* Colla (1824). However there can be no doubt that de Candolle was familiar with Link's edition of the Berlin Botanic Garden catalogue, *Enumeratio plantarum horti regii berolensis altera* which was compiled by Link and in which *Metrosideros rugulosa* D. F. K. Schldl. ex Link was validly published. He cites this edition for the very next species of *Callistemon* that he describes on the same page (Prodromus 3: 223 (1828)) as *C. rugulosa*. Several other citations occur on neighbouring pages. Consequently we believe that the epithet *rugulosus* of Schlechtendal should be retained even though it was not explicitly cited by de Candolle. This approach is equivalent to that of A. B. Court (*loc. cit.*) who cited *Callistemon rugulosus* (Willd. ex Link) DC. as a synonym of *Callistemon macropunctatus*.

Callistemon glaucus (Bonpl.) Sweet, Hort. britt. edn. 2: 208 (1830). — *Metrosideros glaucus* Bonpl., Descr. pl. Malmaison 86, t. 34 (July 1815). — *Callistemon speciosus* (Sims) Sweet var. *glaucus* (Bonpl.) DC., Prodr. 3: 224 (1824). — *Callistemon glaucus* (Bonpl.) F. Muell., Fragm. 1: 14 (1858). NEOTYPE (here selected): Western Australia, 27.9 km east of Denmark, 34° 59' S., 117° 38' E., 14.x.1985, J. H. Ross 3009 (Neotypus: MEL 1551841. Isoneotypi: CBG, PERTH).

Melaleuca paludosa R. Br. in Ait. f., Hort. kew., edn. 2, 4: 410 (1812). NEOTYPE (here selected): King George's Sound, 27.xii.1801, R. Brown s.n. (Bennett no. 4714) (BM!).

[*Callistemon speciosus* auctt. non (Sims) Sweet: Benth., Fl. Austral. 3: 120 (1867).]

In 1803 a species collected by Peter Good was introduced into England and listed by Aiton (*loc. cit.*) as *Melaleuca paludosa*, 'Long-leaved red Melaleuca'. The brief description provided by R. Brown refers to the long leaves, shortly fused stamens and a distribution on the 'South-west coast of New Holland'. It can only apply to the species now known incorrectly as *Callistemon speciosus* (Sims) Sweet. This synonymy was recognized by Benthham (*loc. cit.*) but not by de Candolle (*loc. cit.*). Unfortunately none of the Brown specimens of this entity bear the name *Melaleuca paludosa*; one labelled *Melaleuca* is selected here as the neotype. Although de Candolle cites *Melaleuca paludosa* in the Prodromus (3: 212 (1828)) there is no specimen in his herbarium at Geneva. His description repeats that of Brown.

Metrosideros speciosa Sims, Bot. Mag. 42, t. 1761 (September 1815), the basonym of *Callistemon speciosus* (Sims) Sweet, is described as originating in New South Wales, not Western Australia from where *Melaleuca paludosa* is described. The brief description and the illustration do not permit the name to be applied with confidence to any recognised *Callistemon* species. De Candolle (*loc. cit.*), however, lists a variety *glaucus* based on *Metrosideros glauca* Bonpl. (*loc. cit.*) and the only specimens in his herbarium which bear the name *C. speciosus* are also designated as the variety *glaucus*. We have no doubt that the names *Metrosideros glauca* and *Melaleuca paludosa* apply to the same taxon, a conclusion reached by Benthham (*loc. cit.*) who regarded both names as synonyms of *Callistemon speciosus sensu lato*. Subsequent authors have followed Benthham with the exception of F. M. Bailey (Queensland fl. 2: 594 (1901)) who used the name for the eastern species now known as *Callistemon pachyphyllus* Cheel.

Apart from the uncertain application of the name *Metrosideros speciosa*, the dates given by Stafleu and Cowan (1976) show that *Metrosideros glauca* Bonpl. has priority. However both names are preceded by *Melaleuca paludosa* R. Br. in Ait. f. and the combination *Callistemon paludosus* (R. Br. in Ait. f.) F. Muell. might appear to be the correct name for this species. However *Callistemon paludosus* is the name applied to a widespread rheophytic yellow-flowered species of Eastern Australia. This follows misapplication of the name *Melaleuca paludosa* R. Br. in Ait. f. by Schlechtendal (*Linnaea* 20: 653 (1847)). Specimens sent to Schlechtendal by Behr, now on MEL 105295, form the basis of this misapplication. When Mueller

made the combination *Callistemon paludosus* (Fragm. 1: 14 (1858)) he cited "*Melaleuca paludosa* Schlechtendal . . . et forsan R.Br. in Ait.". He intended the combination to be used for the eastern species but recognized the problem with Brown's epithet.

Current practice is to regard *Callistemon paludosus* F. Muell. as a new species following article 72 of the International Code of Botanical Nomenclature (1983). Paraphrasing example 2: The name *Melaleuca paludosa* Schlechtendal is illegitimate being a later homonym of *Melaleuca paludosa* R. Br.. When Mueller transferred *Melaleuca paludosa* Schldl. to *Callistemon* he called it *Callistemon paludosus*. This name has priority from 1858 and should be cited as *Callistemon paludosus* F. Muell.

Unfortunately both Mueller and Schlechtendal cite R. Brown as the author of the epithet *paludosa* although both express doubt about applying Brown's name to the eastern species. In general an expression of uncertainty is not sufficient to justify disregarding a citation. Article 34.2 is perhaps relevant here as is the citation in the Code (*loc. cit.*) of *Polypompholyx tenella* (R. Br.) Lehmann. Lehmann described *P. tenella* as a new species in Nov. Stirp. Pug. 8: 48 (1844). At the end of the description he wrote "an *Utricularia tenella* R.Br. ?". However this is regarded as sufficient to include Brown's name in parentheses.

If Brown's epithet were unambiguously cited by Schlechtendal and Mueller then Article 55.2 should apply and the combination *Callistemon paludosus* (R. Br.) F. Muell. should refer to the western species to which Brown applied the epithet *paludosa*, irrespective of Schlechtendal's misapplication of the epithet in *Melaleuca*.

If Mueller had explicitly excluded the type of *Melaleuca paludosa* he would be considered to have published a later homonym (Art. 48). However, he merely expressed doubt and it seems certain that he did not know how to apply Brown's description. His description of *Callistemon glaucus* on the same page of the *Fragmenta* (*loc. cit.*), omits any citation of *Melaleuca paludosa* R. Br.

It appears that the situation is not clear cut. We have decided therefore to regard the name *Callistemon paludosus* F. Muell. (1858) as applicable to the eastern species for the following reasons:

- 1) it preserves the traditional and current usage of the epithet
- 2) the epithet *paludosus* will not be transferred from one species of *Callistemon* to another with resulting confusion
- 3) the epithet *paludosus* will no longer be used for any species of *Callistemon* since a prior name exists for the eastern species currently so named (see below under *C. sieberi*).

Callistemon sieberi DC., Prodr. 3: 223 (1828). LECTOTYPE (here selected): *s. loc.*, 1825, Mr. Sieber 637 (G!). ISOLECTOTYPES: Museo Lond. *s. dat.*, "W. Sieb. Esq." *s.n.*, "Aus. D. Herb. Zalbruckner" (PRC!); "Nova Holland. Sieber No. 637 suppl.", *s. dat.* (W!); "Nova Holl. No. 637" (W 177939!).

C. paludosus F. Muell., Fragg. 1: 14(1858). LECTOTYPE (here selected): "ad fl. Onkaparinga", Nov. 1849, *F. Muell. s.n.* (MEL 105295). — *Melaleuca paludosa* sensu Schldl., *Linnaea* 20: 653 (1847), non R. Br. in Ait. f. Hort. kew. edn. 2, 4: 410 (1812).

Callistemon salignus (Sm.) Sweet var. *australis* Benth. Fl. Austral. 3: 121 (1867). LECTOTYPE (here selected): "in running stream. 49" *s.d.*, *H H Behr.* 49. Also additional note in Behr's hand "in rivulo Tanunda". (MEL 105531).

[*Callistemon salignus sensu lato* auctt., non (Sm.) Sweet, Hort. britt. edn. 1: 155 (July-Oct. 1826).]

[*Callistemon australis* (Benth.) Cheel *sensu* J. M. Black, Fl. S. Austral. edn. 2: 605 (1952) apparently *nom. invalid.*]

This species, now known incorrectly as *Callistemon paludosus* F. Muell. (see above and in Spencer and Lumley, *Muelleria* 6(4): 298 (1986)), is a widespread and variable rheophyte. At one extreme, its size, leaf dimensions, filament length and

perigynium vestiture approach that of the small-leaved *Callistemon* of wet montane heathland known currently as *C. sieberi* DC. We have examined a wide range of specimens of both and are convinced that they are distinct. However, the types of *C. sieberi* DC. do not fall within the range of variation of the montane species currently known under that name. They do lie within the range of variation of the rheophytic species currently known as *C. paludosus*. Consequently we are obliged to transfer the name *C. sieberi* to the rheophytic species. Benth. Fl. Austral. 3: 121 (1867), has also expressed doubt over the use of the epithet *sieberi* for the montane taxon.

Black (*loc. cit.*) refers the rheophytic species (now to be known as *C. sieberi*) to *C. salignus* (Sm.) DC. and to *C. salignus* var. *australis* Benth.

The combination *C. salignus* was first made by Sweet (Hort. britt. ed. 1: 155 (July-Oct. 1826)) whose publication preceded that of de Candolle, Prodr. 3: 223 (1828) who is generally but incorrectly cited as the author of this combination.

Benth. broad concept of *C. salignus* is not shared by recent authors. His var. *australis* includes material now referable to *C. pallidus* (Bonpl.) DC. as well as to *C. sieberi* DC. We have lectotypified var. *australis* with a specimen collected in South Australia by H. H. Behr, thereby restricting its use to material correctly known as *Callistemon sieberi* DC.

C. australis (Benth.) Cheel *sensu* J. M. Black (*loc. cit.*) is an illegitimate combination apparently never published by Cheel.

Callistemon pityoides F. Muell., Chem. & Drugg. Australas. Suppl. 5: 94 (1883). LECTOTYPE (here selected): Ovens River, xii.1882, C. Falck s.n. (MEL 652908).

[*C. sieberi* auctt., (e.g. Burbidge and Gray, Flora of the Australian Capital Territory 268 (1970)) non DC., Prodr. 3: 223 (1828).]

Callistemon pityoides is the name Mueller applied to a rare fine-leaved montane plant found in north-east Victoria and south-east Queensland. In conformity with current practice we consider this taxon to be only a variant of the common montane species incorrectly known as *C. sieberi* (see above). Examination of a wide range of material of this species has reinforced this opinion. Consequently we accept the name *C. pityoides* as the only available published name for this species.

NAMES OF UNCERTAIN APPLICATION

Callistemon macropunctatus (Dum.-Cours.) A. B. Court, Victorian Naturalist 73: 175 (1957). — *Metrosideros macropunctata* Dum.-Cours., Bot. cult. edn 2, 7: 277 (June 1814), type unknown.

Metrosideros speciosa Sims, Bot. Mag. 42 t. 1761 (1815).

ACKNOWLEDGEMENTS

We are grateful to staff of the National Herbarium of Victoria, particularly Dr B. Conn, Dr J. Ross and Miss H. Aston, for discussion of taxonomic and nomenclatural problems; to Dr R. K. Brummitt and Mr C. Jeffrey of Kew and to Dr H. J. Eichler for nomenclatural advice; to the M. M. Gibson Trust for monies allowing RDS, while overseas, to examine types in the de Candolle Herbarium, Geneva; to the Australian Biological Resources Study for a grant to PFL to collect in northern New South Wales and southern Queensland; to the directors of AD, BM, BR, BRI, CANB, CBG, CGE, FI, G-DC, H, HEL, HO, K, LE, MEL, NE, NSW, NT, P, PERTH, PR, PRC, TO, U, UNE and W for the loan of specimens and/or for allowing us to work in their institutions.

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Revised manuscript received 15 July 1987.

NEW SPECIES OF BUCKINGHAMIA F. Muell. AND STENOCARPUS R. Br. (PROTEACEAE) FROM NORTHERN QUEENSLAND

by

D. B. FOREMAN* and B. P. M. HYLAND†

ABSTRACT

Foreman, D. B. & Hyland, B. P. M. New species of *Buckinghamia* F. Muell. and *Stenocarpus* R. Br. (Proteaceae) from northern Queensland. *Muelleria* 6(6): 417-424 (1988). — *Buckinghamia ferruginiflora* sp. nov., *Stenocarpus davallioides* sp. nov. and *Stenocarpus cryptocarpus* sp. nov. from northern Queensland are described with notes on distribution, ecology and diagnostic features.

TAXONOMY

The accounts of *Buckinghamia* and *Stenocarpus* for the Flora of Australia are being prepared jointly by us and we take this opportunity to describe a new species of *Buckinghamia* and two new species of *Stenocarpus* from northern Queensland.

BUCKINGHAMIA F. Muell.

Buckinghamia ferruginiflora D. Foreman & B. Hyland, sp. nov.

Arbor ad 30 m alta, anteridibus conspicuis nullis. *Folia* simplicia, spiraliter disposita; lamina elliptico-oblonga, 9-20 cm longa, 2-6 cm lata, coriacea, glabra, acuminata, apice acuta ad \pm obtusa, basin attenuata, margine integra, nervis secundariis utrinsecus 10-20, juxta marginem conjunctis. *Inflorescentiae* terminales vel axillares, racemiformis vel racemis in paniculam disposita, ferrugineo-pubescentibus. *Pedicellae* 4-6 cm longae. *Flores* bisexuales, zygomorphae. *Tepala* c. 10 mm longa, extra dense ferrugineo-pubescentia, intra glabra. *Glandula hypogyna* hippocrepiformis. *Ovarium* glabrum, stipitatum; ovula 4; stylus 7-8 mm longus; praebitor pollinis disciformus, latus, obliquus. *Folliculi* striati, late ovati, 20-28 mm longi, 15-20 mm lati. *Semina* plana, \pm rhomboidea, ala marginali angusta. (Fig. 1).

TYPUS: Portion 62, Parish of Alexandra (Noah Creek), 16° 10' S., 145° 10' E., Queensland, 13.vii.1972, B. P. M. Hyland 6245 (flowering collections). (Holotypus: QRS. Isotypi: BRI, NSW).

Tree up to 30 m tall with stem up to 50 cm diameter at breast height, without conspicuous buttresses. *Bark* less than 2.5 cm thick, nondescript; outer and inner blazes pink to reddish, the inner blaze marked with lace-like fibrous stripes. *Heartwood* dark red. *Branchlets* terete, ferruginous-pubescent at first, soon becoming glabrous. *Leaves* simple, on coppice shoots with up to 3-4 lobes, spirally arranged; lamina elliptic-oblong, acuminate, acute to \pm obtuse at the apex, attenuate at the base, 9-20 cm long, 2-6 cm wide, coriaceous, glabrous, green above and below, somewhat paler beneath; margin entire; midrib prominent on both surfaces; nerves 10-20 on either side of the midrib, looping near the margin; petiole 10-25 mm long. *Inflorescences* terminal or axillary, raceme-like or paniculate with a number of lateral raceme-like branches; 'racemes' including the peduncle up to 20 cm long; all parts of the inflorescence ferruginous-pubescent. *Bract* subtending flower pairs caducous, about 4 mm long. *Pedicels* 4-6 mm long. *Flowers* strongly perfumed, bisexual, zygomorphic in bud, less so at anthesis. *Tepals* about 10 mm long, densely ferruginous-pubescent on outer surface, appearing creamy brown, glabrous inside. *Stamens* 4, sessile near apex of tepals, about 1 mm long; anthers opening by longitudinal, confluent slits. *Hypogynous gland* horseshoe-shaped. *Ovary* glabrous, stipitate; ovules 4; style recurved, about 7-8 mm long; pollen presenter a broad, oblique disk; stigma small, \pm central. *Follicles* striate, asymmetrical,

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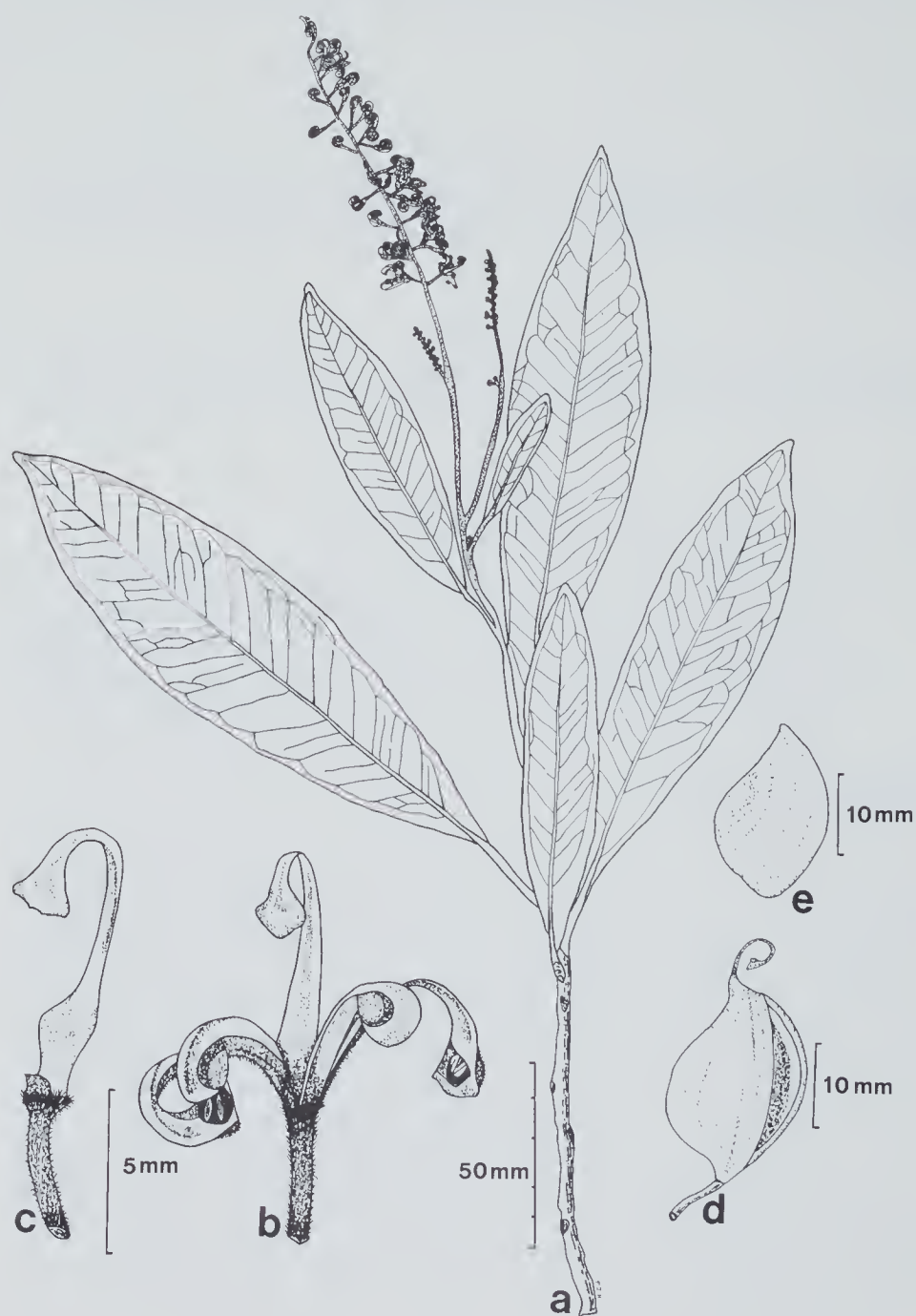


Fig. 1. *Buckinghamia ferruginiflora*. a — habit study; b — flower; c — carpel; d — fruit; e — seed. a-e, from B. Hyland 6245.

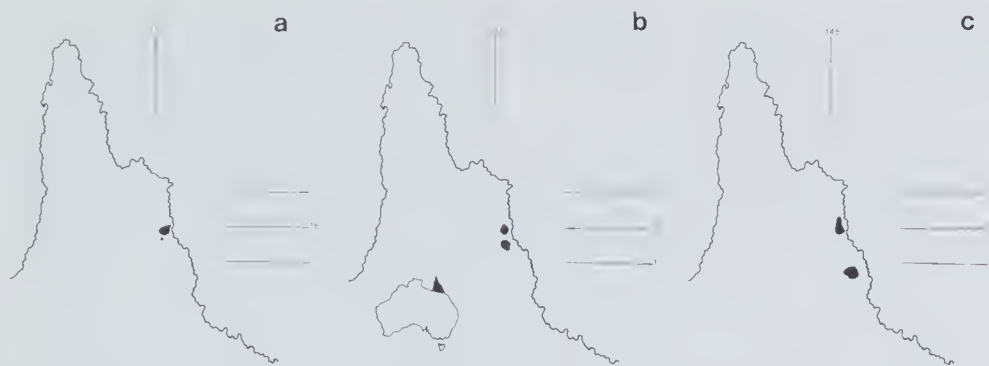


Fig. 2. Distribution maps of: a— *Buckinghamia ferruginiflora*; b — *Stenocarpus davallioides*; c — *Stenocarpus cryptocarpus*.

broadly ovate, opening along their upper margins, 20-28 mm long, 15-20 mm wide, containing up to 4 seeds. *Seeds* flat, \pm rhomboidal in outline with a narrow marginal wing, dappled cream and brown in colour. *Germination* epigeal; cotyledons asymmetrical, \pm obovate, obscurely 3-veined.

REPRESENTATIVE SPECIMENS EXAMINED (Total number examined 9):

Queensland — Noah Creek, 16° 10' S., 145° 25' E., 7.xi.1978, *B. Gray 1088* (MEL, QRS); National Park Reserve 164, Noah Creek, 16° 08' S., 145° 25' E., 24.ix.1985, *B. Gray 4164* (MEL, QRS); Portion 62, Parish of Alexandra, Noah Creek, 19.xii.1972, *B. Hyland 6614* (QRS); Roaring Meg Creek, 16° 10' S., 145° 10' E., 25.viii.1985, *G. Sankowsky 411*; (QRS); Timber Reserve 165, Roaring Meg Creek, 1 km up from Falls, 16° 03' S., 145° 19' E., 11.xi.1984, *G. & N. Sankowsky s.n.* (QRS).

DISTRIBUTION: (Fig. 2a):

North-eastern Queensland, mostly in the vicinity of Noah Creek.

ECOLOGY:

In rainforest or gallery forest at altitudes up to 350 metres. Flowering June to November; fruiting November to December.

NOTES:

Buckinghamia ferruginiflora differs from *B. celsissima* F. Muell. in having the outside of the flowers and inflorescence densely ferruginous-pubescent. The style in *B. ferruginiflora* is only 7-8 mm long while in *B. celsissima* it is 15-20 mm long. The inflorescence in *B. ferruginiflora* is rather open while in *B. celsissima* it is quite dense.

STENOCARPUS R. Br.

***Stenocarpus davallioides* D. Foreman & B. Hyland, sp. nov.**

Arbor ad 40 m alta, anteridibus exignis. *Folia adulta* simplicia vel pinnata vel bipinnatisecta vel tripinnatisecta, spiraliter disposita, primum ferrugineo-pubescentia deinde \pm glabrescentia, chartacea ad coriacea; margine integro; folia simplicia, lamina lanceolata, 5-13 cm longa, 1-2.5 cm lata, apice acuminata ad acuta, basin attenuata, juxta basin 3-nervis, nervis 2 secundariis longitudinalibus conspicuis, petiolo ad 1-2 cm longo; folia composita cum lamina 8-20 cm longa, petiolo 2-4.5 cm longo. *Folia juvenilia* at regenerata tripinnatisecta et anguste divisa; lamina ad 42 cm longa; petiolus ad 10 cm longus. *Inflorescentiae* axillares umbellatae, omnibus partibus ferrugineo-puberulis, cum floribus ad 15; pedunculus 1.5-4.0 cm longus. *Pedicelli* 6-12 mm longi. *Flores* eburneo-virides, bisexuales, \pm zygomorpha. *Tepala* 8-12 mm longa. *Glandula hypogyna* hippocrepiformis. *Ovarium* ferrugineum-pubescente, stipitatum; ovula 5-8; stylus 3 mm longus, praebitor pollinus disciformis, latus, obliquus. *Folliculi* sicci, anguste oblongi, 6.5 cm longi, 3-6 mm lati. *Semina* plana, angusto-oblonga, ala terminali; nucleus seminis 7.5 mm longus x 2.5-3 mm latus. (Fig. 3).

TYPUS: State Forest Reserve 143, North Mary Logging Area, 16° 30' S., 145° 15' E., Queensland, 4.ix.1975, B. Hyland 8374 (flowering and fruiting collections). (Holotypus: QRS. Isotypi: BRI, MEL).

Tree up to 40 m tall with stem up to 160 cm diameter at breast height, slightly buttressed. *Bark* flaky, thin, nondescript; blaze turning orange on exposure. *Heartwood* pink to dark red. *Branchlets* terete, ferruginous-pubescent at first, soon becoming glabrous. *Adult leaves* simple, pinnate, bipinnatisect or tripinnatisect, spirally arranged, ferruginous-pubescent at first, soon becoming glabrous or with some hairs persistent on the undersurface near the midrib and main nerves, chartaceous to \pm coriaceous, margin entire, midrib well defined, reticulations barely visible: *simple leaves* — lamina lanceolate, acuminate to acute at apex, attenuate at base, 5-13 cm long, 1-2.5 cm wide, with two well defined longitudinal nerves arising near the leaf base; petiole 1-2 cm long; *pinnate, bipinnatisect or tripinnatisect leaves* — lobes lanceolate, acuminate; lamina 8-20 cm long; petiole 2-4.5 cm long. *Juvenile and coppice leaves* — tripinnatisect, more finely divided than adult leaves; lamina up to 42 cm long; petiole up to 10 cm long. *Inflorescences* axillary, borne towards the ends of branchlets, umbellate with up to 15 (commonly about or less than 12) flowers, peduncle 1.5-4 cm long, all parts of the inflorescence ferruginous-puberulous, becoming sparsely so. *Pedicels* 6-12 mm long. *Flowers* creamy green, bisexual, \pm zygomorphic. *Tepals* 8-12 mm long, sparsely ferruginous-puberulous outside, glabrous inside. *Stamens* 4, about 1 mm long, sessile, opening by longitudinal slits. *Hypogynous gland* horseshoe-shaped. *Ovary* ferruginous-pubescent, stipitate; gynophore sparsely ferruginous-puberulous; ovules 5-8; style recurved, about 3 mm long (excluding pollen presenter), glabrous or with a few scattered ferruginous hairs; pollen presenter a broad, oblique disk; stigma small, central. *Follicles* glabrous, dry, narrow-oblong, attenuate at both ends, up to 6.5 cm long, 3-6 mm wide, opening lengthwise down one side, then becoming flattened, containing up to 8 seeds. *Seeds* flat, narrow-oblong, with a terminal wing; seed nucleus 7.5 mm long, 2.5-3 mm wide. *Germination* epigeal; cotyledons \pm spatulate.

REPRESENTATIVE SPECIMENS EXAMINED (Total number examined 29):

Queensland — Thornton Peak, 21.ix.1937, L.J. Brass & C.T. White 304 (BRI); Thornton Peak, 16° 10' S., 145° 20' E., 14.xi.1973, T.G. Hartley 14061 (BRI, QRS); State Forest Reserve 143, North Mary Logging Area, 16° 30' S., 145° 15' E., 24.v.1973, B. Hyland 6743 (MEL, QRS); South-West ridge of Thornton Peak, 16° 11' S., 145° 20' E., 27.ix.1984, A.K. Irvine 2315 (MEL, QRS); Upper Daintree River, 15.vi.1967, I. Olsen NSW 121587 (BRI); Gold Hill near China Camp, 16° 03' E., 145° 12' E., vii.1973, L.J. Webb & J. Tracey 10901 (BRI).

DISTRIBUTION: (Fig. 2b):

North-eastern Queensland, restricted to areas around Mt Lewis and Thornton Peak.

ECOLOGY:

In rainforest at altitudes from 660 m to 1260 m. Flowering appears to be particularly prolific in November but buds at various stages of development can be found during February, April, May, July and October; fruiting February to October.

NOTES:

The specific epithet refers to the finely divided fern-like foliage of juvenile plants and of coppice shoots on adult plants, which shows a remarkable resemblance to the leaves of some *Davallia* species.

Apart from *Stenocarpus davallioides* there are two other species occurring in northern Australia which have highly dissected juvenile or coppice leaves, viz. *S. cunninghamii* R.Br. and *S. salignus* R.Br.. The simple adult leaves of *S. davallioides* are more like those of *S. salignus* than those of *S. cunninghamii*. However, *S. davallioides* differs from both these species in having a mixture of simple, pinnate,



Fig. 3. *Stenocarpus davallioides*. a — habit study; b — seedling; c — seed; d — fruit; e — dehiscent fruit; f — enlargement of inflorescence; g — enlargement of flower. a, f-g, from B. Hyland 3174 RFK; b, from A. Irvine 1666; c-e, from A. Irvine 1543.

bipinnatisect and tripinnatisect adult leaves as well as having the juvenile and coppice leaves much more finely divided than those of either *S. cunninghamii* or *S. salignus*. Among other differences one of the more obvious ones appears to be the fewer number of flowers per umbel in *S. davallioides* compared with the other species mentioned. The fruits of all three species are narrow-oblong and attenuate at the ends, with their dimensions overlapping considerably.

***Stenocarpus cryptocarpus* D. Foreman & B. Hyland, sp. nov.**

Arbor ad 25 m alta, anteridibus. *Folia adulta* simplicia, alterna; lamina plerumque elliptica, nonnumquam \pm oblonga vel obovata, 9-14 cm longa, 3.3-7.5 cm lata, coriacea, atro-ferruginea ad ferrugino-tomentosa, glabrescentia, apice acuta ad rotundata, et obtusa mucronata, margine integro; nervis secundariis utrinsecus 5-9; petiolus gracilis, 3-8 cm longus. *Folia juvenilia* atque regenerata plerumque bipinnata; lamina ad 115 cm longa; petiolus ad 15-20 cm longus. *Inflorescentiae* axillares, umbellatae, cum floribus ad c. 20; pedunculus 5.5-9.5 cm longus, omnibus partibus atro-ferrugineis ad ferrugineo-puberulis, floribus ad c. 20; pedunculus 5.5-9.5 cm longus. *Pedicelli* 10-17 mm longi. *Flores* eburnei, bisexuales, \pm zygomorphi. *Tepala* 20-30 mm longa. *Glandula hypogyna* \pm oblonga, apice obliquo, c. 4 mm longa, adnata ad basem gynophori. *Ovarium* ferrugineo-pubescent, stipitatum; ovula 7-11; stylus 15-18 mm longus; praebitor pollinis disciformis, latus, obliquus. *Folliculi* sicci, anguste oblongi, ad extremia attenuati, 10-13 cm longi, 1.4-1.8 cm lati. (Fig. 4).

TYPUS: State Forest Reserve 310, Swipers Logging Area, 17° 22' S., 145° 47' E., Queensland, 13.iii.1969, B. P. M. Hyland 2199 R. F. K. (flowering collection). (Holotypus: QRS. Isotypi: BRI).

Tree up to 25 m tall with stem up to 40 cm diameter at breast height, buttressed. *Bark* nondescript, flaky; dead bark layer thin, dark brown; subrhynchidome cream; outer blaze cream, granular; inner blaze cream with oak grain. *Branchlets* terete, dark ferruginous to ferruginous-pubescent, becoming glabrous. *Adult leaves* simple, alternate; lamina mostly elliptical, or sometimes \pm oblong or obovate, acute to rounded, ending in a blunt point at apex, attenuate at base, 9-14 cm long, 3.3-7.5 cm wide, coriaceous, dark ferruginous to ferruginous-tomentose, becoming \pm glabrous or some hairs persistent along the midrib and main veins, drying dull yellowish-green above, brownish beneath or slightly darker than above; margin entire; midrib well defined on both surfaces; nerves straight, looping towards the margin, visible but not very prominent on both surfaces; reticulations rather sparse, not well defined; petiole slender, dark ferruginous to ferruginous-tomentose, becoming glabrous, 3-8 cm long. *Juvenile and coppice leaves* mostly bipinnate, with a few pinna pinnate, pinnatifid or pinnatisect; lamina up to 115 cm long, ferruginous-tomentose, becoming glabrous, leaflets variable in size and shape, the apex acuminate to acute, the base often oblique; petiole up to 15 cm to 20 cm long. *Inflorescences* axillary, borne towards the end of branchlets, umbellate with up to about 20 flowers (commonly about 16), peduncle 5.5-9.5 cm long; all parts of the inflorescence dark ferruginous to ferruginous-puberulous, becoming sparsely so. *Pedicels* 10-17 mm long. *Flowers* cream, strongly perfumed, bisexual, \pm zygomorphic. *Tepals* 20-30 mm long, ferruginous-pubescent outside, glabrous on inside. *Stamens* 4, about 2-2.5 mm long, sessile, opening by longitudinal slits. *Hypogynous gland* \pm oblong, apex oblique, about 4 mm long, fused to the base of the gynophore for most of its length. *Ovary* ferruginous-pubescent, stipitate; gynophore glabrous, 10-13 mm long; ovules 7-11; style curved, about 15-18 mm long, glabrous; pollen presenter a broad, oblique disk; stigma small, central. *Follicles* (description based on a few old follicles collected from the ground) glabrous, dry, narrow-oblong, attenuate at the ends, 10-13 cm long, 1.4-1.8 cm wide, opening lengthwise down one side, becoming flattened. *Seeds* not seen.

REPRESENTATIVE SPECIMENS EXAMINED (Total number examined 19):

State Forest Reserve 755, Russell River Catchment, Bartle Frere, 17° 23' S., 145° 45' E., 18.xii.1968, S.J. Dansie s.n. (QRS); Cooper Creek, 16° 10' S., 145° 24' E., 28.viii.1985, B. Gray 4136 (QRS); State Forest Reserve 755, Boonjee Logging Area, 17° 25' S., 145° 45' E., 4.xii.1972, B. Hyland 6592 (MEL,



Fig. 4. *Stenocarpus cryptocarpus*. a — habit study; b — enlargement of flower; c — juvenile leaf. a-b, from A. Irvine 1242; c, from A. Dockrill 788.

QRS); Tree Reserve 165, Monkhouse, Rossville Logging Area, 15° 43' S., 145° 19' E., 22.xi.1983, *B. Hyland* 12869 (QRS); McDowall Range, 16° 05' S., 145° 17' E., 17.iv.1969, *B. Hyland* 2233 *R.F.K.* (QRS).

DISTRIBUTION: (Fig. 2c):

In two restricted areas of north-eastern Queensland, namely Boonjee and the area from McDowell Range to the east coast.

ECOLOGY:

In rainforests at altitudes from 10 m to 1000 m. Flowering December to April; fruiting (?) August to November.

NOTES:

The specific epithet refers to the fact that despite long and careful searching it has not been possible to collect adequate mature fruit of *S. cryptocarpus* to complete its description.

The relationships of *S. cryptocarpus* are difficult to determine at the present time, but it does not appear to be closely related to other species occurring in north Queensland. The rather broad, penniveined adult leaves show little, if any, affinities to taxa allied to *S. salignus*.

Superficially the flowers of *S. cryptocarpus* resemble those of *S. reticulatus*, being about the same dimensions and colour but differing in a number of ways, including having long hairs on the inside surface of the tepals. The fruit of *S. reticulatus* is flattened and \pm semi-circular in shape, which is quite different from the narrow-oblong fruit of *S. cryptocarpus*.

The relatively long bipinnate coppice and juvenile leaves of *S. cryptocarpus* are quite distinctive.

ACKNOWLEDGEMENTS

We are most grateful to Dr G. A. M. Scott for his assistance with the Latin descriptions, the Director, Queensland Herbarium, for the loan of specimens and several reviewers for helpful comments. Thanks are due to Mr T. Nolan for the illustrations of *S. cryptocarpus* and *S. davallioides* and to Mrs T. G. Hyland for the illustration of *B. ferruginiflora*.

NOTES ON HOVEA R. Br. (FABACEAE) : 1

by

J. H. ROSS*

ABSTRACT

Ross, J. H. Notes on *Hovea* R. Br. (Fabaceae) : 1. *Muelleria* 6(6): 425-428 (1988). — A general introduction to the endemic Australian genus *Hovea* is provided. The common alpine *Hovea* in south-eastern Australia is elevated to species rank as *H. montana* and the necessary combination is made. A lectotype is selected for *H. montana* and the distinctions between this species and *H. beckeri* F. Muell. are given.

GENERAL INTRODUCTION

Hovea, a small endemic genus of about 20 species, was described by R. Brown in Ait. f., Hort. Kew. edn 2, 4: 275 (1812), and named in honour of the Polish collector Anthony Pantaleon Hove who sent many plants to the Royal Botanic Gardens, Kew. The genus has a widespread but disjunct distribution on mainland Australia, occurring in south-western Western Australia from south of Geraldton to a little east of Esperance, in Arnhem Land in the Northern Territory, and from the Cape York Peninsula in Queensland southwards through much of New South Wales, eastern and southern Victoria into the southern Flinders Ranges in South Australia. In Tasmania species are distributed in the north and east and in the central highlands.

Polhill (1976) referred *Hovea* to the tribe Bossiaseae which he divided into two groups, namely the *Templetonia* group consisting of *Templetonia* R. Br., *Hovea*, *Plagiocarpus* Benth. and *Lamprolobium* Benth. which have alternately basifixed and dorsifixed anthers with narrow connectives, collar-like lipped arils and straight radicles, and the *Bossiasea* group with uniform dorsifixed anthers having a broad connective (the anther slits down the face of the thecae, not lateral), usually hooded cap-like arils, and a slender curved radicle exerted from the cotyledons. Polhill (1981) noted that technically there was little difference between the *Templetonia* group of genera and the small tropical American tribe Brongniartieae consisting of *Brongniartia* Kunth. and *Harpalyce* Moc. & Sesse ex DC.; Bentham (1865) included *Lamprolobium* in the sub-tribe Brongniartieae of the Galegeae and Taubert (1894) added the genus *Plagiocarpus*. Arroyo (1981) supported the view expressed by Polhill (1981) and noted that the taxonomic separation of the *Templetonia* group of Australian genera in the tribe Bossiaseae from the American Brongniartieae rested largely on the grounds of convenience together with arguments "to the effect that such groups probably represent endpoints of a once widespread austral complex of ancient papilionates". Following a detailed analysis Crisp & Weston (1987) took the step foreshadowed previously by Polhill and by Arroyo and transferred the *Templetonia* group of genera to the Brongniartieae.

Hovea is distinguished from the other members of the *Templetonia* group of genera in having seeds with an aril which is three or more times as long as broad, pods which are not or scarcely longer than broad, blue, purple or white corollas (except for the markings) with a broad standard and a short keel, and simple leaves with generally spreading nerves and reticulate venation although the latter is often obscured by hairs.

The hairs in *Hovea* are taxonomically important. Often mixed hair types occur together with an understorey of short hairs beneath scattered longer hairs or sometimes the hairs vary on different parts of the same plant. The hairs are uniseriate with small basal cells and an elongate distal cell but sometimes the distal

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cell is elongated in both directions to give a T-shaped hair although one arm is often very much shorter than the other. The resulting asymmetrically biramate hairs are usually appressed and the biramate nature of the hairs is easily overlooked.

The size, shape and position of the paired bracteoles in relation to the calyx are important taxonomically as are the size and shape of the bract and its position relative to the bracteoles.

I have been studying *Hovea* for several years with a view to preparing an account for the Flora of Australia and have found it to be a taxonomically perplexing genus, especially in eastern Australia where species delimitation and recognition is often extremely difficult. It is no consolation, but previous workers on the genus have apparently experienced similar difficulties. Much remains to be done but rather than wait until work has been completed it is intended to publish results progressively in a series of notes.

Bentham (1864) recognized six species in Western Australia and five species in eastern Australia. Strangely perhaps, among the eastern species he maintained *H. linearis* (Sm.) R. Br. and *H. heterophylla* A. Cunn. as separate species even although he realized that they were very closely allied and that intermediates existed. Apart from *H. acutifolia* A. Cunn. and *H. longipes* Benth., all of the other material from eastern Australia was referred to *H. longifolia* R. Br. within which he recognized four varieties. In treating *H. longifolia* as an "omnibus species" Bentham stated "The following forms, usually considered as distinct species, pass into each other by such insensible gradations, that I am unable to distinguish them otherwise than as varieties". Material that has accumulated in herbaria since Bentham's time has confirmed the existence of "insensible gradations" between some of the taxa to which he referred.

Domin (1925) followed Bentham in treating *H. longifolia* as an omnibus species and recognized within it five varieties and five subvarieties. Domin's treatment was not followed generally and, without wishing to be unduly critical, the main effect of his work was to clutter up the literature with names.

It is apparent from a letter dated 16 February 1950 written by R. H. Anderson, Chief Botanist, National Herbarium of New South Wales, to C. T. White, Government Botanist, Queensland Herbarium, that W. F. Blakely had worked on the genus. Anderson's letter reads in part "Mr Blakely was interested in this genus and much of his work had reached the manuscript stage at his retirement. He proposed naming a number of new varieties and some species, but we are not proceeding with publication as Miss Garden of my staff has sorted our material of this genus and finds that she cannot agree with Mr Blakely's conclusions". I have not succeeded in tracing a copy of Blakely's manuscript.

The results of a survey of limited extent of the material in NSW by Thompson & Lee (1984) has proved to be an extremely useful foundation upon which to build. Thompson & Lee were the first authors to realize that *H. longifolia* is a distinctive species with a narrow range of distribution almost entirely within the central coastal area of New South Wales and that most of the other taxa included in it by Bentham and by Domin do not belong with *H. longifolia*.

HOVEA MONTANA, A CHANGE OF RANK FOR THE ALPINE HOVEA

J. D. Hooker (1856) treated this common low spreading shrub found in the highlands of Tasmania and in the alpine and subalpine areas of the Australian Alps in the southern Tablelands of New South Wales and eastern Victoria as a variety of the widespread *H. purpurea* Sweet to which he applied the name var. *montana*. Willis (1967) realized that var. *montana* did not belong with *H. purpurea* and transferred the variety to *H. longifolia*.

It is clear that this entity is distinct from both *H. purpurea* and *H. longifolia* and, as indicated by Thompson & Lee (1984), is worthy of specific rank. As the name *montana* has been associated at varietal rank with this entity for so long it

seems appropriate to retain this epithet at specific rank. This opportunity is taken of effecting the necessary new combination and change of rank.

Hovea montana (J. D. Hook.) J. H. Ross, comb. et stat. nov.

H. purpurea Sweet var. *montana* J. D. Hook., Fl. Tasmaniae 1: 93 (1856). – *H. longifolia* R. Br. var. *montana* (J. D. Hook.) J. H. Willis, Muelleria 1: 127 (1967); Handb. Pl. Victoria 2: 282 (1973). LECTOTYPE (here chosen): Gunn “800/1837 Burghley Surrey Hills 16/2/37”, K. ISOLECTOTYPE: NSW (NSW 97888). See below.

Hovea “sp. Q” sensu Thompson & Lee, Fl. New South Wales 101(2): 138 (1984), pro parte.

Hooker based his description of *H. purpurea* var. *montana* on material collected in Tasmania by Gunn and numbered 800. The numbers accompanying Gunn’s specimens are not collecting numbers but species numbers as it was his custom to give the same number to collections of what he took to be one taxonomic entity even if the specimens were collected on different dates or from different localities (Burns & Skemp, 1961; Haegi, 1982).

In Herbarium Hookerianum at K there is a sheet of material collected by Gunn which comprises six specimens, five in fruit and one in flower. The specimens represent four different collections. The three short fruiting twigs mounted at the top of the sheet and almost covered by a note in Gunn’s hand pinned to the sheet apparently belong together. Gunn’s note for them reads “800 *Hovea*. A very distinct & pretty small species very common on the mts. to an elevation of 4000 ft. The plants are bushy but seldom exceed 9 inches to a foot high.” A fruiting specimen mounted on the left hand side of the sheet beneath one of the twigs referred to above is accompanied by a label in Gunn’s hand which reads “800/1837 Burghley Surrey Hills 16/2/37” and a page of Gunn’s notes which is pinned to the sheet and almost completely obscures the specimen and the label. A fruiting specimen mounted on the right hand of the sheet is accompanied by a label in Gunn’s hand which reads “800/1842 Marlborough 8/1/41” and Gunn’s notes on the habit and distribution of the species. A flowering specimen mounted centrally and facing the foot of the sheet has written on the sheet next to it “R. Gunn Esq. V.D.^s. Land”. Almost in the centre of the sheet is a label numbered 799 which does not refer to any of the specimens on the sheet.

All of the collections on this sheet in K are regarded as syntypes. As Hooker made special mention of the fruits in the protologue I now select the specimen mounted on the left hand side of the sheet accompanying the label on which is written “800/1837 Burghley Surrey Hills 16/2/37” from among the syntypes as the LECTOTYPE of *H. purpurea* var. *montana*. An ISOLECTOTYPE is housed in NSW (NSW 97888). The Gunn specimens labelled “800/1842 Marlborough 8/1/41” and “800/1842 Marlborough 17/10/40” in NSW and numbered NSW 97886 and NSW 97885 respectively are regarded as probable syntypes as is a specimen in E labelled “V.D. Land Gunn-800/1847”.

Mueller labelled several collections from Victoria *Hovea gelida* but apparently this manuscript name was never published.

Thompson & Lee (1984) included under their *Hovea* “Sp. Q” a “form in the Central and Northern Tablelands which appears to differ only in the dimensions of the flower parts, especially of bract and bracteoles; . . .”. This entity is referable to *H. beckeri* F. Muell. *H. beckeri* is common in the southern Flinders Ranges in South Australia (included under *H. longifolia* var. *longifolia* by Webber, 1986) and occurs sporadically in the Tablelands of New South Wales, the populations in the two States being separated by a large geographical discontinuity. *H. beckeri* is allied to *H. montana* but differs in habit, in having larger bracts and bracteoles, larger flowers and long stamens and styles. The stamen filaments and styles usually persist after the corolla has been shed and are very distinctive. Annotations on some specimens indicate that Blakely had applied the manuscript name ‘*H. lanceolata* var. *stylosa*’ to this entity.

ACKNOWLEDGEMENTS

I am most grateful to the Directors/Curators of AD, BM, CGE, E, HO, K and NSW for the loan of specimens and for an Australian Biological Resources Study grant which facilitated work on this genus.

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TWO NEW SPECIES OF POMADERRIS LABILL. (RHAMNACEAE) FROM SOUTH-EASTERN NEW SOUTH WALES

by

NEVILLE G. WALSH*

ABSTRACT

Walsh, Neville G. Two new species of *Pomaderris* Labill. (Rhamnaceae) from south-eastern New South Wales. *Muelleria* 6(6): 429-435 (1988). — *Pomaderris brogoensis* and *P. virgata* are described as new species from south-eastern New South Wales. The habitat, distribution and relationships of the species are discussed and illustrations provided.

TAXONOMY

Pomaderris brogoensis N. G. Walsh, sp. nov.

Frutex vel arbor parva usque ad 9 m altam. *Ramuli* pilis stellatis minutis necnon pilis paucis simplicibus longioribus. *Folia* obovata vel subrotundata 8-18 mm longa, 7-14 mm lata, leniter undulata, supra viridia pallida, (griseo-viridia desiccata), velutinis pilis minutis stellatis, nervata indistincta, infra griseo-viridia (cinerascens desiccata), stellato-pilosa, pinnatim nervata; venae primariae et laterali (3-6 paria) pilis appressis vel expansis leviter, pallidis vel brunneolis, simplicibus, paucis, c. 0.8 mm longis necnon pilis stellatis appressis. *Inflorescentia* paniculata, terminalis, pyramidalis, laxa, usque ad 3 cm longam, interdum foliis paucis. *Flores* apetalae, pedicellatae. *Sepala* oblonga, 1.6-2 mm longa, stellato-pilosa externe et pilis appressis, simplicibus paucis, usque ad 0.5 mm longis. *Stylus* 0.8-1.1 mm longus, trilobus, divisus basi fere. *Capsulae* ovoideae latae ad obovoideae c. 3 x 2 mm.

Slender shrub or spreading, often multi-stemmed tree 3-9 m high. *Bark* smooth, or somewhat corky (to 2 cm thick) on older trees. *Branchlets* pubescent with fine dense grey stellate hairs and a few longer simple hairs. *Petiole* 2-6 mm long. *Lamina* obovate to subrotund, 8-18 mm long, 7-14 mm wide; apex broadly obtuse or slightly emarginate, the midvein sometimes exerted as a point to 0.5 mm long; margins slightly undulate; lamina penninerved with 3-7 pairs of lateral veins which are inconspicuous above; upper surface of lamina dull pale green when fresh, drying to mid grey, densely covered with minute stellate hairs; lower surface of lamina grey-green when fresh, drying to pale grey, densely stellate-hairy, the stellae coarser than those of the upper surface and completely concealing the lower epidermis; midvein and larger lateral veins of the lower surface with some forwardly appressed or slightly spreading, pale to brown, simple hairs to 0.8 mm long (often conspicuous only on younger leaves), as well as stellate hairs which are longer than those between the nerves and forwardly appressed. *Stipules* lanceolate, mostly 3-5 mm long, tan, stellate-hairy, often with a few short simple hairs along the midrib and margins, frequently persisting after leaves have fallen. *Inflorescences* paniculate, terminal, pyramidal, mostly to 3 cm long and with c. 15-30 flowers, occasionally including a few reduced leaves. *Buds* ovoid, slightly angular, about 2 mm long just prior to anthesis. *Pedicels* about 2 mm long at anthesis, moderately densely covered with fine stellate and simple hairs. *Sepals* oblong, 1.6-2 x 0.7-0.9 mm, acute at apex, covered externally with fine stellate hairs with a few forwardly appressed simple hairs to 0.5 mm long, golden yellow and glabrous on inner face with a raised midline, becoming recurved. *Petals* absent. *Stamens* alternate to the sepals; filament 1-1.3 mm long; anther oblong, about 1 mm long. *Ovary* semi-inferior, about 0.6 mm diam. at anthesis, conically raised by 0.3-0.5 mm above level of attachment of sepals, the raised part densely covered by simple hairs to 0.8 mm long. *Style* 0.8-1 mm long, usually cleft almost to the base into 3 equal arms. *Capsules* broadly ovoid to obovoid, about 3 x 2 mm, finely stellate-hairy, sometimes retaining a few simple hairs on the thalamus tube; operculum on inner face of each of the 3 segments almost round, about 1.5 mm diam., papery. *Seeds* flattened-ellipsoid, about 2 mm long, shining brown with a small white apical aril. Fig. 1.

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TYPE COLLECTION:

New South Wales — South coast sub-region, Bemboka State Forest, 6.7 km E. from Bemboka Peak, 36° 36' 10" S., 149° 42' 30" E., alt. 470 m, 4.xi.1986, *D. E. Albrecht* 2956. (Holotype: MEL 1553283. Isotypes: CBG, K, NSW).



Fig. 1. *P. brogoensis*. a — flowering branchlet, x 2/3. b — flower, x 8. c — undersurface of leaf, x 3; inset showing simple hairs along midvein, x 8. d — capsule, x 8. a-c from *D. E. Albrecht* 2956 (type); d from *N. G. Walsh* 1664 (MEL 1553284).

SELECTED SPECIMENS EXAMINED (total examined, 9):

New South Wales — Brogo Pass, 300 m ESE. from Brogo R. — Browns Ck confluence, l.xii.1986, N. G. Walsh 1664, (MEL 1553284). Brogo River, c. 1 km downstream from bridge, 12.xii.1986, W. M. Molyneux s.n. (MEL 1553285). Dampier State Forest, 3.3 km N. of the Belowra—Nerrigundah Rd on the Belowra East fire trail, 12.xii.1986, J. D. Briggs 2138 (CANB). Nadgee Nature Reserve, Merricka River Crossing, 15.x.1977, M. Parris 7792 (CBG). Twofold Bay, [c. 1860], Morton s.n. (MEL 55643).

DISTRIBUTION AND CONSERVATION STATUS (Fig. 3):

Known from scattered localities from near Belowra south to Nadgee Nature Reserve, but records are concentrated in the upper catchment of the Brogo River. All records are within the south coast botanical subdivision of New South Wales (Jacobs and Pickard, 1981). The conservation status of the species is assessed as 3RC (Briggs and Leigh, in press), i.e. the species is known from a conservation reserve, is rare and has a known range exceeding 100 km.

HABITAT:

All annotated collections are from (usually steeply) sloping sites with predominantly northerly aspect. The substrate is invariably rocky (sedimentary) with shallow, often gritty soils between outcrops.

NOTES:

A distinctive species with well-defined habitat requirements, *P. brogoensis* most closely resembles *P. cinerea*, which has a similar distribution. Previous collections of *P. brogoensis* have been identified as *P. cinerea*. The two species have in common apetalous flowers and both have leaves which are very finely hairy on both surfaces, giving the plants an overall dull or grey-green appearance. The key below serves to distinguish the two species.

1. Leaves obovate to almost round, 8-18 mm long; simple hairs present on (at least young) stems, petioles, midvein of leaf undersurface, calyx and sepals; stipules often persistent. Flowering late October to early December *P. brogoensis*
1. Leaves ovate to elliptic, mostly 20-40 mm long; simple hairs absent from all parts; stipules soon deciduous. Flowering mid-December to early January *P. cinerea*

Although the two species occur in close proximity at at least three of the localities cited for *P. brogoensis*, no specimens of indeterminate character have been collected. It is a common attribute of *Pomaderris* that several species, often morphologically very close, occur in a fairly restricted area.

The specific epithet refers to the Brogo area of New South Wales from where the species was first known and from near where most subsequent collections have been made.

Pomaderris virgata N. G. Walsh, sp. nov.

Frutex virgatus usque ad 8 m altum. *Ramuli* hornotini et annotini pilis densis velutinis cuprinis, ramuli vetiores glabrescentes. *Folia* lanceolata, anguste elliptica vel oblonga, basi rotundata apice acuto, 25-90 mm longa, 7-22 mm lata, margine recurvo, nervorum 9-20 pares, supra atrovirentia glabra, infra pilis densis, cremeis vel aureis sericeis, 0.5-1 mm longis, inclinatibus versus marginem, pili venarum et marginum colorati appressi plus quam interveniunt. *Inflorescentia* paniculata terminalis rotundata usque ad 6 cm diametro, moderate densa interdum foliis paucis. *Flores* apetalae, pedicellatae. *Sepala* oblonga 1.6-2.2 mm longa, externis dense obiectis pilis partim appressis sericeis c. 1 mm longis. *Stylus* c. 1 mm longus trilobus divisus c. medio. *Capsulae* obovoideae c. 3 x 2 mm.

Erect, slender *shrub* to 8 m high, usually unbranched near the ground. *Branches* ascending. *Bark* smooth, becoming thick (to 2 cm) and tessellated on trunks of old plants. *Branchlets* of current and previous season's growth densely covered with pale to dark copper-coloured, short, simple hairs, or the hairs sometimes crimson on the youngest parts; older stems glabrescent. *Petiole* to 12 mm long; indumentum that of the younger branchlets. *Lamina* lanceolate, narrowly elliptic or oblong, 25-90 mm long, 7-22 mm broad, acute at the apex, rounded at the base, with recurved margins, penninerved with 9-20 pairs of lateral veins; upper surface of lamina dark



Fig. 2. *P. virgata*. a — branchlet in bud and early flower, x 2/3. b — flower, x 8. c — undersurface of leaf, x 2/3; inset, x 4. d — leaf, T. S. showing appressed hairs of midvein and lateral veins on undersurface, x 4. e — capsule, x 8. a-d from N. G. Walsh 1708 (type); e from D. E. Albrecht 2318 (MEL 1550010).

green, wholly glabrous, with veins slightly impressed; lower surface of lamina densely covered with cream to pale golden silky hairs 0.5-1 mm long and inclined toward the margin, the hairs of veins and margin more strongly coloured and appressed so that the surface of the hair layer is virtually level either side of the raised midvein. *Stipules* narrowly lanceolate, mostly 3-4 mm long, densely pubescent and early deciduous. *Inflorescences* paniculate, terminal, rounded, to 6 cm diameter and with c. 100-150 flowers, occasionally including a few leaves. *Buds* ovoid, 2-3 mm long just prior to anthesis. *Pedicels* about 2 mm long at anthesis, densely covered with silky hairs. *Sepals* oblong, 1.6-2.2 x 0.8-1.2 mm, acute at apex, covered externally with silky, semi-appressed hairs about 1 mm long, golden yellow and glabrous on inner face with raised midline, strongly recurved at anthesis. *Petals* absent. *Stamens* alternate to the sepals; filament 1.5-2.0 mm long; anther oblong, about 1 mm long. *Ovary* inferior, about 1.2 mm diameter at anthesis, with a tuft of simple hairs 0.5-0.8 mm long covering the summit. *Style* c. 1 mm long, cleft to about midway into 3 equal arms. *Capsules* obovoid, about 3 x 2 mm, evenly covered with semi-appressed, simple hairs. *Ripe seeds* not seen. Fig. 2.

TYPE COLLECTION:

New South Wales — South coast, Nalbaugh National Park, beside tributary of Wog Wog River, 100 metres N. from the river, 2.5 km ESE. from Wog Wog Mountain trig point, 37° 04' 00" S., 149° 31' 20" E., alt. 320 m, 24.x.1986, *N. G. Walsh 1708* (Holotype: MEL 1553286. Isotypes: BRI, CBG, HO, K, MEL 687869, NSW).

SELECTED SPECIMENS EXAMINED (total examined, 11):

New South Wales — Summit of Dr George Mountain, 6 km ENE. from Bega, 2.xii.1986, *N. G. Walsh 1663* (MEL 1553287). Egan Peaks Nature Reserve, SW. - running spur 1.6 km W. of Burrigat Peak, 17.x.1986, *J. D. Briggs 2085* (CANB). Wadbilliga National Park, at picnic ground against Tuross R. cascades, 21.viii.1983, *J. H. Willis s.n.* (MEL 684075). Yambulla State Forest, Mountain Peak, 2.5 km NE. from Mt Poole, 21.vii.1986, *D. E. Albrecht 2705* (MEL 1553288). Yurramie State Forest, near Wolumla Peak, 16.x.1986, *D. M. Binns 69* (MEL 1553289).

DISTRIBUTION AND CONSERVATION STATUS (Fig. 3):

Known from only about 8 sites, all in the south coast botanical sub-division of New South Wales (Jacobs & Pickard, 1981), from Wadbilliga National Park near the Tuross Falls south to Yambulla State Forest near Mt Poole (about 15 km from the Victorian border). The conservation status is assessed as 3RC (Briggs & Leigh, in press).

HABITAT:

Found in rocky sites in the vicinity of watercourses, or on ridges where it is invariably associated with rocky outcrops, within an altitude range of 300-750 metres. Soils are typically skeletal and derived from granite, other igneous parent materials (e.g. syenite) or Ordovician sediments.

NOTES:

P. virgata most closely resembles, and is probably most closely related to, *P. costata*, the principle features in common being the apetalous flowers and the general nature of the indumentum. The two species are distinguished on the features set out in the key below.

1. Leaves ovate to broadly ovate, mostly 15-40 mm long; length 1.4-2.5 (av. 1.9) x breadth; margins slightly undulate. Indumentum on leaves and young stems pale brown to golden; lateral veins of leaf undersurface protruding above hair layer between veins. Usually a spreading, rounded shrub to c. 3.5 m high *P. costata*
1. Leaves lanceolate to oblong, mostly 25-90 mm long; length 3.3-4.5 (av. 4.0) x breadth; margins not undulate. Indumentum on leaves and young stems distinctly copper-coloured or crimson; lateral veins of leaf undersurface immersed within hair layer between veins (but remaining visible). Usually a slender, more or less obconical shrub to 9 m high *P. virgata*

Like *P. virgata*, *P. costata* typically occurs on rocky sites. Both species have been collected within a few kilometres of each other at Egan Peaks Nature Reserve but no specimens of intermediate character have been collected from there or elsewhere.

The specific epithet refers to the characteristic slender, upright habit of the plant.

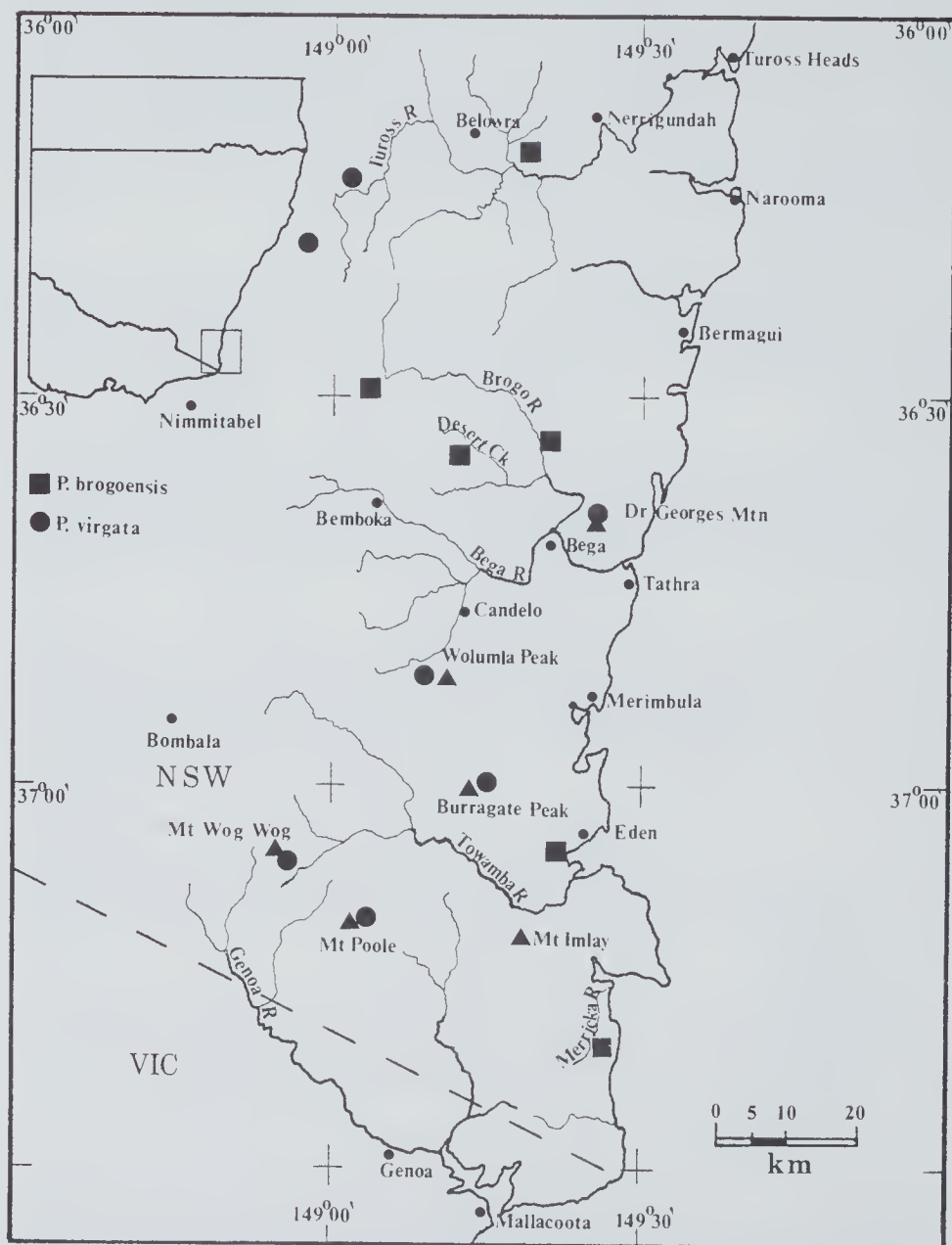


Fig. 3. Distribution of *Pomaderris brogoensis* (■) and *P. virgata* (●).

ACKNOWLEDGEMENTS

I am indebted to Mrs M. Parris and my colleague Mr D. E. Albrecht for bringing these new species to my notice, checking other herbaria (CBG, NSW) for collections and accompanying me in the field to collect material of these species. I am also grateful to Mr J. D. Briggs for providing material of and valuable information regarding these species, and to Miss A. M. Podwyszyński for the illustrations.

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Jacobs, S. W. L. & Pickard, J. (1981). 'Plants of New South Wales'. (Government Printer: Sydney).

Manuscript received 10 March 1987.

A NAME CHANGE IN THE GENUS *ACMENA* DC. (MYRTACEAE)

by

G. P. Guymer* and B. P. M. Hyland†

ABSTRACT

Guymer, G. P. & Hyland, B. P. M. A name change in the genus *Acmena* DC. (Myrtaceae). *Muelleria* 6(6): 437-438 (1988). — The new combination *Acmena ingens* (F. Muell. ex C. Moore) Guymer & Hyland, based on *Nelitris ingens* F. Muell. ex C. Moore, is made for the species which has been known as *Acmena brachyandra* (Maiden & Betche) Merr. & Perry (basionym *Eugenia brachyandra* Maiden & Betche).

NOMENCLATURE

Acmena ingens (F. Muell. ex C. Moore) Guymer & Hyland, comb. nov.

BASIONYM: *Nelitris ingens* F. Muell. ex C. Moore, Cat. Nat. Industrial Products New South Wales, Int. Exhib. Commissioners, Sydney 48 (1861). TYPE: Richmond River, in 1861?, *C. Moore* 19 (HOLOTYPE: MEL 60948. ISOTYPE: K).

Memecylon cerasiforme Nilson, Timber Trees New S. Wales 98 (1884) as “*cerasiformis*” nom. illeg., non *M. cerasiforme* Kurz. TYPE: “brush forests, near banks of creeks, on the Richmond River”, not located.

Memecylon australe C. Moore in Moore & Betche, Handb. Fl. New S. Wales 208 (1893) nom. illeg., non *M. australe* F. Muell. ex Triana. — *Acmena australis* L. Johnson, Contrib. New S. Wales Natl Herb. 3: 100 (1962). TYPE: “Upper Clarence and Richmond River”, not located.

Eugenia brachyandra Maiden & Betche, Proc. Linn. Soc. New S. Wales 23: 15 (1898). — *Acmena brachyandra* (Maiden & Betche) Merr. & Perry, J. Arnold Arb. 19: 17 (1938), synon. nov. LECTOTYPE: (fide Hyland 1983): Tintenbar, *W. Baeuerlen* [NSW 136991a] (NSW). SYNTYPES: Ballina, *W. Baeuerlen* [NSW 136990] (NSW); north-coast line, Queensland, *F. M. Bailey* s.n. (NSW).

During examination of specimens of *Decaspermum* J. & G. Forster by the senior author at the National Herbarium of Victoria (MEL) a specimen of *Acmena* DC. and an accompanying letter by J. H. Maiden to F. J. H. Mueller were discovered. Maiden's letter of 10 March 1893 documented the nomenclature of the plant described later by Maiden & Betche (1898) as *Eugenia brachyandra*. On page 4 of his letter Maiden provides a copy of a description of *Nelitris ingens* F. Muell. ex C. Moore, which was given in Moore's “Woods Indigenous to the Northern Districts of the Colony collected by Mr Charles Moore” in the “Catalogue of the Natural and Industrial Products of New South Wales; with a map and introductory account of its population, commerce and general resources” (London International Exhibition, 1862: London).

This publication has been examined at the Library, Royal Botanic Gardens, Kew, and *Nelitris ingens* is described on page 28 of the catalogue. However, there is an earlier edition of this catalogue published in Sydney in 1861 by the International Exhibition Commissioners entitled “Catalogue of the Natural and Industrial Products of New South Wales, exhibited in the School of Arts by the International Exhibition Commissioners, Sydney, October 1861”. A copy of this earlier catalogue is also held at Kew and once formed part of W. J. Hooker's library.

In his paper “Woods from the Northern Districts of the Colony, collected by Mr. Charles Moore” in the 1861 catalogue Moore provides the following entry for *Nelitris ingens*: “xix. *Nelitris ingens*, F. Muell. *Myrtaceae*. Cherry [local name]. Cobun Bun [Aboriginal name]. Richmond River [habitat]. This singularly handsome tree occurs on nearly all the branches of the Richmond, and always on its immediate

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banks; it is chiefly remarkable for its bright red Guava like fruit, which is borne in terminal bunches in great quantities; fruit edible but astringent; timber not used". This name is validly published under the 1983 International Code of Botanical Nomenclature and is legitimate. There is no doubt that it applies to the species which has been known as *Acmena brachyandra* (see Hyland (1983) for revision of *Acmena*). Furthermore, a fruiting specimen of this species collected by C. Moore from the Richmond River and labelled "19. *Nelitris* ? *ingens*" [in Mueller's hand] is held at MEL and a duplicate of it is at K. The K specimen is labelled "Northern Woods N.S.W. No. 19 *Nelitris ingens* Muelr. Hab. Richmond River". In the 1862 catalogue reproduction of the description of *Nelitris ingens* two minor typographical errors were corrected, viz. "F. Muelr." to "F. Muell." and "Guava like" to "guava-like".

ACKNOWLEDGEMENT

We thank Dr P. Wilson for searching for types of *Memecylon australe* and *Memecylon cerasiforme* at NSW.

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 Maiden, J. H. & Betche, E. (1898). Descriptions of four new species of New South Wales plants. *Proc. Linn. Soc. New S. Wales* 22: 15-19.

Revised manuscript received 5 May 1987.

NEW SPECIES OF CALADENIA R. Br. (ORCHIDACEAE) FROM VICTORIA AND NEW SOUTH WALES, AUSTRALIA

by

G. W. CARR*

ABSTRACT

Carr, G. W. New species of *Caladenia* R. Br. (Orchidaceae) from Victoria and New South Wales, Australia. *Muelleria* 6(6): 439-447 (1988). — Two new species of *Caladenia* (section *Calonema* : Orchidaceae) are described. *C. brachyscapa* G. W. Carr is endemic in Victoria and *C. rosella* G. W. Carr is known from Victoria and New South Wales. The affinities, distribution, ecology and conservation status of the new species are discussed.

TAXONOMY

Caladenia brachyscapa G. W. Carr, sp. nov.

Species propria *C. reticulatae* R. D. Fitzg. similis ut videtur differt tamen in proprietatum combinatione : foliis anguste-linearibus, confertim longe-hirsutis; scapo brevissimo, confertim hirsuto, trichomatibus glandulosis vel sparsissimus vel absentibus; segmentis perianthii brevibus, apicem versus \pm aequaliter contractis; lamina osmophori a lamina cetera distincta; osmophorum conspicuorum sepalinorum petalinorumque trichomatibus laxae ad sub-arcte contiguis, 1-3 cellulatis, sphaericis ad allantoideis.

Herb perennating from an annually renewed tuberoid; tuberoids and most of subterranean stem not seen, but stem below leaf invested in a finely-fibrous brown tunic. *Leaf* subtended by an opposite, membranous, closed-cylindrical, minutely mucronate, truncate bract 5-6 mm long x c. 8 mm wide when opened. *Leaf* basal, hirsute, solitary, sessile, \pm erect, linear-lanceolate, 4.5-10.5 cm long x 4-6 mm wide (in fertile specimens), acute, often partly withered at anthesis; abaxial surface very densely long-hirsute, especially in lower part, with \pm patent eglandular uniseriate trichomes to 11 mm long; trichomes sparser upwards and becoming antrorse; basal cell of trichomes narrowly barrel-shaped, white-opaque, microscopically rugose, the remaining 1-5 cells extremely fine, transparent; leaf wholly green or with few to abundant deep red blotches or spots basally on the abaxial surface. *Scape* abbreviated, 3.2-12.5 cm long, 1-1.5 mm diam., slightly flexuose, rigidly erect, green to wholly light reddish-purple, densely hirsute with mostly eglandular trichomes like those of the leaf, the longest trichomes 3-7.5 mm long, decreasing in length upwards along the scape; trichomes \pm patent but towards apex of scape somewhat antrorse by flexure of the basal cell; glandular trichomes if present (occasionally), very short, confined to just below the fertile bract, 3-celled with the apical cell spherical, light red. *Sterile bract* (3-)15-45 mm below floral bract, slightly spreading, narrow-lanceolate, subulate, acute or acuminate, (9-)12-14(-17) mm long x (2-)2.5-3 mm wide, externally hirsute with sparse, very short, antrorse, eglandular trichomes, internally glabrous; margins strongly inrolled. *Floral bract* similar, (7.5-)13-15 (-17) mm x (2.5-)3-5.5(-8) mm, embracing pedicel, ovary and base of dorsal sepal; margins less inrolled. *Flower* solitary; perianth segments widely spreading though characteristic posture *in vivo* unknown, short but labellum proportionately large; floral fragrance unknown. *Pedicel* (2-)5-11(-14) mm long, shortly hirsute. *Ovary* obconic-fusiform, 5-8 mm long, 2-2.5 mm diam., shortly and densely hirsute with unequal, mostly 3-celled glandular trichomes with spherical dark red apical cells; rare longer eglandular trichomes present in some specimens. *Dorsal sepal* erect (18-)24-28 mm long, 1.2-1.8 mm wide towards base, strongly curved forward, linear-lanceolate, long-acuminate, the lamina channelled and narrowed to 0.6-0.8 mm wide below a terminal osmophore; dorsal sepal nearly glabrous except for osmophore trichomes but with few, scattered, 1-3-celled glandular trichomes internally and

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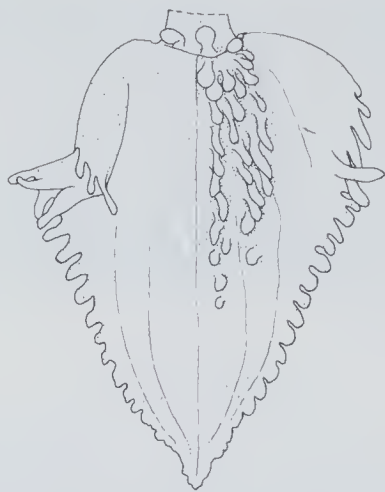


Fig. 1. *Caladenia brachyscapa*. Labellum, with the calli drawn on one half only, $\times 4.5$. From holotype.

externally around the base; sepal pink or light red with darker red median striations on both surfaces. *Osmophore of dorsal sepal* not clearly differentiated from remainder of sepal, dark reddish-brown, \pm linear, obtuse, 5.5-7.5 mm long (rarely longer) \times 0.75-1.8 mm wide, consisting of glandular trichomes between which the lamina of the osmophore is irregularly visible; spacing of trichomes less than diameter of terminal cell; trichomes with 1-3 cells, the terminal and or sub-terminal cells spherical to sausage-shaped, dark red. *Lateral sepals* (18-)20-25(-30) mm long \times 2.5-3.5 mm wide, deflexed, slightly inturned, falcate, with a narrow-lanceolate lamina evenly tapering to a terminal osmophore; minimum width of lamina 0.3-1.8 mm; osmophore not or only weakly differentiated from remainder of sepal; distribution of trichomes and colour similar to those of the dorsal sepal. *Osmophores of lateral sepals* similar to those of the dorsal sepal, 6-8(-10.5) mm long \times 0.6-1.5 mm wide. *Petals* widely spreading, linear or linear-lanceolate, 20-23 mm long \times 1-2.3 mm wide, terminated by a linear or lanceolate, sub-acute osmophore 4.5-7 mm long \times 0.6-0.8 mm wide; lamina of petaline osmophores not or only slightly differentiated from petal lamina, with a minimum width of 0.6 mm below osmophore; petals very sparsely ciliate in proximal part with 1-3-celled glandular or eglandular trichomes; colour of petals similar to lateral sepals but the adaxial median zone usually more intensely marked with red. *Labellum* articulated on a short claw \pm 1 mm long \times 1.5-2.5 mm wide, broadly cordate, sub-acute, 10.5-12 mm long \times 7.5-10 mm wide at about the middle, apparently carnosous throughout *in vivo*, very broadly channelled, \pm erect at base and curved forward, the apex recurved under the lamina; margin of labellum from the proximal one-sixth or one-fifth to the apex with about (15-)18-23(-25) angular-truncate, blunt to sub-acute antrorse teeth or indentations; maximum length of teeth (0.7-)1-1.5 mm at about middle of labellum, evenly diminishing in size towards the base and apex of the labellum, where reduced to shallow gibbous crenulations. *Calli of labellum* in 6 longitudinal, fairly wide-spaced rows, occupying a proximal median zone 6.5-8.5 mm long \times 3-3.5 mm wide, extending to within 3.5-4 mm of apex; inner 2 rows each with 10-18 calli, only 3 or 4 calli in outer 2 rows; calli strongly antrorse, 1.3-1.7 mm maximum length (at base of labellum), rather polymorphic, slender-stalked and clavate-globose in each row against the base of the column, others changing to laterally-narrowed stalked calli with elongate foot-like heads, diminishing in size and finally rudimentary towards labellum apex where c. 0.3 mm high. *Colour of labellum* apparently light rose-pink or perhaps yellowish-pink in proximal half

grading to very deep red at apex; margins of lamina light red with red striations along the veins continuous with marginal teeth, the teeth also red; abaxial side of lamina similarly coloured to adaxial side, sometimes with pink suffusions around the claw; calli of labellum concolorous, red or dark red, except for pale yellow (when dry) basal, long-stalked, globose-clavate calli. *Column* erect, strongly curved forward, (10-)13-14 mm long, 4-5 mm wide including axis and wings, with 2 prominent, rounded, swollen, bright yellow glands $\pm 1.5 \times 1$ mm on inner base; axis ± 1.5 mm wide, narrowly winged below, expanding upwards into thick, transparent, rounded, incurved-cucullate wings 2-2.5 mm wide; axis of column green with reddish-purple longitudinal striations or suffusions, especially on inner base where strongly contrasting with yellow glands; *anther* terminal, blunt, 2-3 mm x 2 mm with a minute terminal apiculus 0.3-0.5 mm long; anther flaps green or reddish-purple; pollinia 4, flat, \pm irregularly triangular. *Stigma* 1.7-2 mm diam., immediately behind anther, circular, centrally depressed. *Capsule* not seen.

TYPE COLLECTION:

Nirranda, c. 32 km south-east of Warrnambool, Victoria, 38° 29' S., 142° 50' E., Victorian plant grid K20 or K29, 16.x.1959, *Mathieson family & A. C. Beaglehole 18642* (Holotype: MEL 561935).

SPECIMENS EXAMINED:

Victoria — Nirranda, 27.ix.1959, *Mathieson family & A.C. Beaglehole 18640* (MEL 1530097). Near Warrnambool, 27.ix.1959, *A. C. Beaglehole with Mathieson family s.n.* (MEL 687101). Nirranda, x.1958, *B. A. Fuhrer s.n.* (MEL 561936).

DISTRIBUTION:

Known with certainty only from the type locality (*A. C. Beaglehole* pers. comm., *B. A. Fuhrer* pers. comm.) but another collection of a plant with an unopened flower bud (*A. C. Beaglehole 213000 & E. W. Fink*, 8.ix.1966, MEL 1530098) from Port Campbell National Park, about 25 km south-east of the type locality, may be referable to *C. brachyscapa*.

ECOLOGY:

Little is known of the ecology of *C. brachyscapa*. It used to occur in partially cleared and grazed forest which is now totally cleared (*B. A. Fuhrer* pers. comm.). All collections apparently came from this one locality. Some of the collections have fine white sand and dark grey organic matter adhering to the mycorrhizal zone of the stem just below the bract subtending the leaf. This indicates that the surface soil at least was sandy grey loam likely derived from Tertiary sediments which probably correspond with the mottled duplex soils with ironstone described for the region by Pitt (1977). These originally carried *Eucalyptus obliqua** forest (Pitt, 1977).

AFFINITIES AND TAXONOMIC NOTES:

Caladenia brachyscapa was referred by Willis (1970) to *C. reticulata* R.D. Fitzg. as a "form" from the "Warrnambool district". *C. reticulata sens. strict.* is confined to South Australia (Weber and Bates 1986) and Victoria (cf. Carr 1986) where it is very rare (Carr unpublished data). Several described and undescribed taxa in the *C. reticulata* complex occur in Victoria but *C. brachyscapa* does not seem closely related to any of these.

The salient features of *C. brachyscapa* are the small linear-lanceolate leaf densely clothed with long trichomes, the very short, densely hirsute scape with long eglandular (rarely glandular) trichomes, the short floral segments each with relatively

* Nomenclature follows Forbes *et al.* (1984).

undifferentiated osmophores and the rather polymorphic calli on the labellum which are concolorous except for the longer basal calli.

Of particular significance are the morphology and distribution of the floral trichomes which form the petaline and sepaline osmophores. These glandular secretory trichomes (Carr & Staff unpublished data) which produce the chemical attractants for the thynnid wasp pollinators (see Carr 1986) have important taxonomic utility. They differ in size, number of cells, shape and distribution, features which correlate with the various informal taxonomic alliances in *Caladenia* (sect. *Calonema*) and apparently reflect evolutionary lines.

In species with clearly defined, terminal, clavate sepaline and/or petaline osmophores, the glandular secretory trichomes which make up the osmophore are reduced to the single terminal cells. These are hemispherical, densely packed, and totally obscure the osmophore lamina. *C. reticulata sens. strict.* and its congeners (e.g. *C. calcicola* G. W. Carr, *C. hastata* (Nicholls) Rupp and *C. fitzgeraldii* Rupp) best exemplify this model. With osmophores consisting of sub-dense to loose-packed, 1-3-celled trichomes arranged over the greater part of the lamina of the sepals and petals, the relationships of *C. brachyscapa* are not with the *C. reticulata* alliance. The floral trichomes of *C. brachyscapa* approach those of the taxa in the *C. patersonii* R. Br. complex, but are denser, especially on the distal and terminal parts of the perianth segments.

In many respects *C. brachyscapa* resembles the Tasmanian endemic *C. caudata* Nicholls, though the former is only known from dried material which may lose important features on drying (Carr 1986). Shared features include leaf shape and indumentum, a short scape, flower size and colour (such as can be determined), shape of perianth segments and a broad labellum with very similar marginal teeth. The labellum, however (except in one specimen seen), is not prolonged into a petaline cauda and the long, clavate-globose basal calli in *C. brachyscapa* are not like those in *C. caudata*.

CONSERVATION STATUS:

Caladenia brachyscapa, apparently a narrow endemic, is possibly extinct. However, it may prove to be extant in the Port Campbell National Park or the western coastal fringe of the Otway Ranges.

Caladenia rosella G. W. Carr, sp. nov.

Caladenia pulcherrima F. Muell. Fragm. 5: 93, 101 (1865), nom. invalid, pro parte.

Ex affinitate *C. patersonii* R. Br., differt tamen in proprietum combinatione : foliis brevissimus, compare latis; scapo brevi; floribus parve pallide ad vivide roseis, moschatis; labello columnaue brevi; callis singularibus; tempore florendi valde praecoqui.

Herb perennating from a \pm globular, annually renewed tuberoid to 9 mm diam. *Stem* subterranean, to c. 6 cm long; tuberoids and stem invested in a dense, finely-fibrous, long-persistent, pale brown tunic derived from previous tuberoid and stem tissue. *Leaf* subtended by an opposite, membranous closed-cylindrical, minutely mucronate, truncate bract 6-8 mm x 9 mm. *Leaf* basal, hirsute, solitary, sessile, stiffly erect or ascending, lanceolate, 4.5-8.5 cm long x 0.5-0.8 cm wide, acute; adaxial and abaxial surfaces green, irregularly blotched or spotted red-purple on basal abaxial one quarter to one third; both surfaces densely to sub-densely hirsute with \pm patent, straight to slightly retrorse, uniseriate, eglandular trichomes to 8.5 mm long; basal cell of trichomes narrowly barrel-shaped, whitish-opaque, microscopically rugose, the remaining 1-5 cells long, extremely fine, transparent; adaxial leaf surface more sparsely hirsute with smaller trichomes. *Scape* (8.5-)10-17 cm long, to 1.8 mm diam., greenish- to reddish-purple throughout, arising at centre of leaf, rigidly erect, \pm straight, hirsute throughout with \pm patent, eglandular trichomes to 6.5 mm long similar to those on leaf, and with shorter scattered

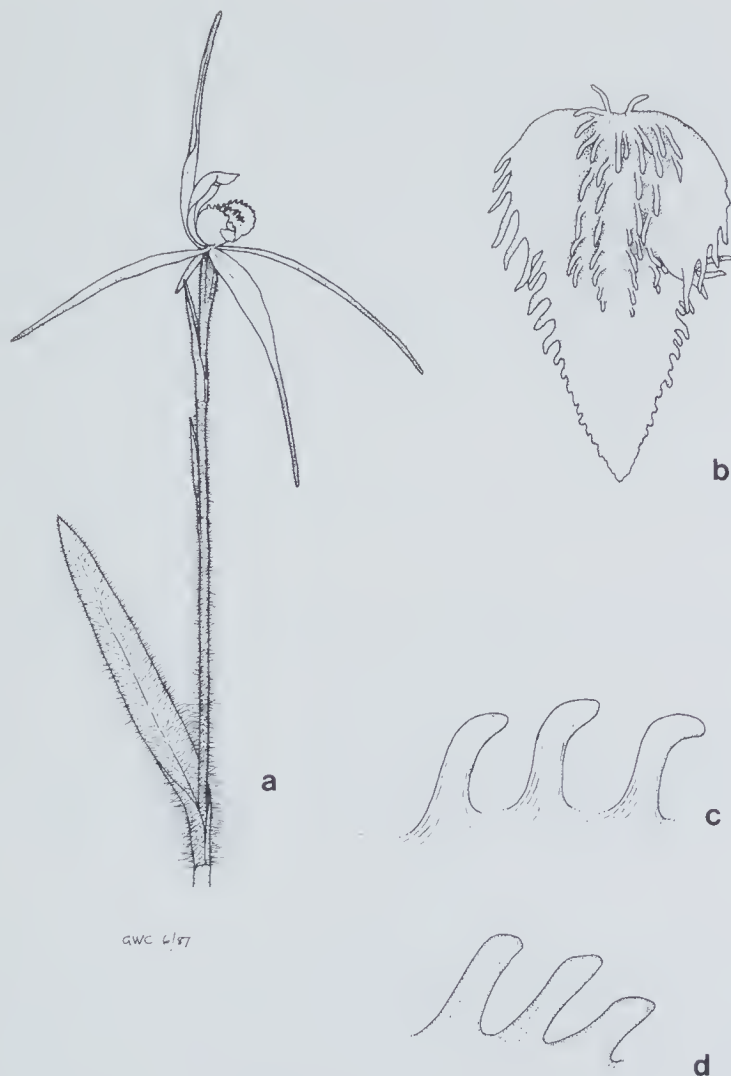


Fig. 2 *Caladenia rosella*. a — plant, above-ground parts, x 1. b — flattened labellum, x 3.75. c — calli from the inner row of calli at about the middle of the labellum, x 7.5. d — marginal teeth of labellum at about the middle of the labellum, x 9.5. c and d from colour transparencies of plants at the type locality.

glandular trichomes, especially above the sterile bract; glandular trichomes similar to eglandular ones but terminated by a minute, \pm transparent to dark reddish-purple, spherical cell. *Sterile bract* above middle of scape, slightly spreading, narrow-lanceolate, acute to acuminate, 15-21.5 mm x 2.3-5 mm wide with strongly involute margins; bract externally hirsute with short, strongly antrorse, eglandular trichomes and with or without scattered glandular trichomes, internally glabrous, green to purplish throughout. *Floral bract* similar, 12-17 mm x 3.5-5.5 mm, embracing the pedicel below, green tinged purple to wholly purple; margins less inrolled. *Flower* solitary, in shades of pale to intense bright pink, scented with a sweet musk-like

floral fragrance perceptible above c. 18° C. *Pedicel* (5-)1-2.5(-3.5) mm long. *Ovary* fusiform, (4.5-)6-10 mm long, 2-3 mm diam., densely glandular-hirsute with trichomes to 2.5 mm long; trichomes with 3-7 cells, patent to slightly antrorse. *Perianth* stiffly spreading. *Dorsal sepal* ± erect to inclined forward (24-)35-46 mm long x (1.5-)2-2.5 mm wide at a maximum in the proximal one-third, the narrow-lanceolate, incurved lamina gradually tapering into a linear-acuminate, involute or channelled cauda; dorsal sepal externally sparsely hirsute at base, with transparent, eglandular 1-5-celled trichomes, remainder of sepal with scattered glandular trichomes below, these becoming dense to very dense in the terminal one third to one fifth but the lamina visible between the trichomes; dorsal sepal internally very sparsely glandular-hirsute at base, ± glabrous on the expanded part of the lamina, then becoming densely hirsute in upper one third to one fifth as on the external surface; glandular floral trichomes which comprise the osmophores 1-3(-5)-celled, dark red or purple, each cell ovoid, multicelled trichomes ± moniliform; dorsal sepal pale to bright pink (nearest RHS Purple Group 76 D in pale specimens, to Red-purple Group 76 D in intensely coloured specimens) usually with a somewhat darker median zone and indistinct striations along the main veins, the abundant glandular trichomes giving a red or reddish-brown hue to the floral segments. *Lateral sepals* (25-)30-45(-47) mm long, ± horizontal to deflexed, ± straight to strongly arcuate, very slightly falcate with a ± flat, lanceolate lamina (2.8-)3.5-4.7 mm wide evenly tapering into a very narrow channelled cauda of c. 1 mm minimum width, about one third to half the length of the sepal; trichomes on lateral sepals the same as those on the dorsal sepal; lateral sepals similar in colour to the dorsal sepal. *Petals* narrow linear-lanceolate, (22-)30-40 mm long x 2-2.5 mm wide, ± flat, the lamina evenly tapering into a fine cauda, ± straight and horizontal to deflexed-arcuate; petaline trichomes similar to those of sepals but sometimes sparser, the margins with rather distant glandular or eglandular cilia; cilia (1-)2-3-celled, to 0.3 mm long, the glandular ones with a small, poorly developed, ± colourless terminal cell; colour of petals similar to that of sepals. *Labellum* articulated on a short claw, 1-1.5 mm long x 1.5-1.8 mm wide, cordate at base, broadly ovate-cordate when flattened, (9-)10-12(-14) mm long x (6.5-)8-10 mm wide including marginal teeth, tapering to an acute or sub-acute apex, carinose, ± erect at base then ± evenly curved forward through about 365°, the apex rolled under and ± obscured by the lamina when viewed from the front; margins of labellum above about the proximal one fifth with projections elongating to strongly antrorse, sub-terete, obliquely truncate, sub-acute, finger-like teeth about the middle of labellum and from these gradually diminishing in size to the apex where they are shallow, gibbous serrations or crenulations; marginal teeth and projections or crenulations (20-)22-25(-30) in number, the longest teeth 1.75-2.2 mm long. *Calli of labellum* in 4 or 6 longitudinal rows, occupying a median zone extending from the base for two thirds to four fifths the length of the labellum; inner 2 rows each with 11-13(-23) calli, adjacent 2 rows each with 8-10(-15) calli, outer rows (when present) with 1-3 calli each; calli either rather long-stalked, arcuate, strongly antrorse with a very slender acute to obtuse foot-like head at maximum development, or relatively undifferentiated and finger-like, to 1.75 mm long, longest towards the base of labellum and diminishing in size towards the apex, ultimately becoming very small wart-like protuberances. *Lamina of labellum* adaxially deep pink in distal half (nearest RHS Red-purple Group 61 A), grading to pale pink proximally, sometimes streaked with darker pink along veins continuous with marginal teeth of labellum; marginal teeth or indentations and calli more intensely deep pink, sometimes slightly bicolorous with paler tips; abaxial surface of labellum deep pink (like adaxial surface) in distal third to half, grading to uniform pale or very pale pink (nearest RHS Purple Group 76 D) proximally, the margins often edged in darker pink and sometimes with a median flush of deep pink extending towards base of labellum and around the claw; labellum waxy in texture. *Column* 9.5-12 mm high and 4.5-5 mm wide viewed from the front, strongly arched from the base to below the anther but erect about the middle, produced forward with the terminal anther held in a ± horizontal

position over the broadest part of the labellum; column axis \pm 1.5 mm wide, deep pink internally and externally with inconspicuous darker longitudinal striations and flecks, with a pair of prominent, strongly contrasting, ovate, swollen yellow glands c. 0.7 mm long on the inner base; axis narrowly winged at base, these wings contracting to their narrowest in the proximal third, then expanding in the upper half into rigid, rounded, strongly cucullate wings 2-2.5 mm wide; wings \pm transparent and colourless to pinkish-transparent throughout, waxy and glossy; axis and wings sparsely hirsute externally in lower half with short 1-3-celled glandular or eglandular trichomes. *Anther* blunt with a minute apiculus, \pm wedge-shaped, 2.5-3 mm long \times 2-2.5 mm wide at base; anther flaps green about the axis, the remainder yellow-green, often flushed with deep purplish-red along outer margins; pollinia 4, flat, \pm irregularly triangular. *Stigma* circular, centrally depressed, c. 2 mm diam., green, glistening, situated immediately behind anther; viscidium very narrow, c. 1.5 mm long, touching the anther flaps. *Capsule* (absent from type collection) turgid, broadly fusiform, to 15 mm long \times 6.5 mm diam., chartaceous at dehiscence. *Seeds* pale brown.

TYPE COLLECTION:

Hurstbridge, c. 3 km N. of township, Victoria, 37° 36' S., 145° 12' E., Victorian plant grid N34, 22.ix.1985, *G. W. Carr 10391* (Holotype: MEL 1554666).

SPECIMENS EXAMINED:

New South Wales — Albury, no date, *H. Beattie s.n.* (MEL 683868).

Victoria — Evansford, 9.ix.1936, (ex herb.) *G. Lyell s.n.* (MEL 573989). Grampians, no date, *F. Mueller s.n.* (MEL 655209). Maryborough, no date, *Mc Kibbin s.n.* (MEL 610761). Hurstbridge, c. 0.5 km S. of type locality, 9.ix.1981, *G. W. Carr 9027* (MEL 1554667).

DISTRIBUTION:

All old collections are from scattered localities in western and central Victoria (Grampians and Maryborough/Evansford districts) and in New South Wales (Albury district) adjacent to north-eastern Victoria. The only recent collections are from the type locality or to its immediate south. This suggests a formerly wide distribution for *C. rosella* but also that its range has been severely reduced.

ECOLOGY:

The only ecological and biological data available have been collected at or near the type locality where *C. rosella* inhabits dry, mostly west-facing slopes on skeletal soils derived from Silurian sediments. The vegetation is open woodland dominated by old coppice growth of *Eucalyptus goniocalyx*, *E. macrorhyncha* and *E. polyanthemus*. Understorey vegetation is very sparse. Data were recorded from a 10 \times 10 m quadrat at the type locality. The quadrat contained 58 vascular species of which the following (apart from the above eucalypts) had the highest cover value (none exceeding 5%): *Acacia acinacea*, * *Aira caryophyllea*, * *Briza maxima*, *Danthonia pallida*, *Daucus glochidiatus*, *Drosera whittakeri*, * *Hypochoeris glabra*, *Microseris scapigera*, *Millotia tenuifolia*, *Poa sieberiana*, *Ranunculus pumilio*, *Senecio tenuiflorus* and *Wahlenbergia stricta* (nomenclature follows Forbes *et al.* (1984)). Ten of the 58 species (including *C. rosella*) were orchids.

The Maryborough and Evansford localities, considered with the habitat at the type locality, suggest that *C. rosella* may have been a component of box-ironbark associations of central and northern Victoria (see Cochrane *et al.* 1968). The Grampians locality is too imprecise to indicate habitat.

AFFINITIES, TAXONOMIC NOTES AND BIOLOGY:

The highly distinctive *C. rosella* belongs to the *C. patersonii* R.Br. *sens. lat.* complex which is characterized by the 1-5-celled glandular trichomes scattered over the surface of all perianth segments, though densest on their distal parts. This contrasts with the *C. reticulata* Fitzg. *sens. lat.* complex in which the 1-celled

glandular trichomes on the sepals and petals are densely aggregated into terminal osmophores (see Carr 1986 and previous discussion here under *C. brachyscapa*).

Of all taxa (described and undescribed) in the *C. patersonii* complex in eastern Australia known to me (Carr unpublished data), *C. rosella* is remarkable for several features. It is the smallest *C. patersonii* relative in the combined dimensions of leaf, scape and floral parts. It is also the earliest flowering of all *Caladenia* sect. *Calonema* species in Victoria, usually being in full flower in mid September. Some specimens at the type locality have been recorded in flower as early as late July and as late as late October. No other Victorian *C. patersonii* relative has such consistently brilliant, pink flowers (though some specimens have pale pink perianths). *C. rosella* is also the only known *Caladenia* sect. *Calonema* which has a musk-like floral fragrance (Carr unpublished data). Features of the labellum, apart from its small size, may also be unique in the eastern Australian *C. patersonii* complex. Unlike those of most of its relatives, the marginal teeth and calli on the lamina are often much less differentiated into a foot-shaped head on a distinct stalk. They are often rather finger-like.

Rupp (1940) published the illegitimate name *C. patersonii* var. *rosea* for a "form of *C. patersonii* of a beautiful heliotrope colour" which came from central Tasmania. He also noted "numerous specimens" collected by Gunn in Tasmania corresponding with his *C. patersonii* var. *rosea* and further remarked that he could find "no other variation from the average form except that the flower was smaller than usual". I have not yet investigated the taxonomic status of this *Caladenia*, but pink Tasmanian *Caladenia* species of the *C. patersonii* complex are represented by specimens at MEL and these may correspond to Rupp's taxon. On ecological grounds, and in view of the distribution of other *Caladenia* taxa, it is unlikely that *C. rosella* occurs in Tasmania.

The pollinator of *C. rosella* has not been observed but it is assumed to be a thynnid wasp attracted for sexual rewards — the pseudocopulatory pollination syndrome (see Carr 1986). Natural pollination has occurred at the type locality but most plants there have been hand pollinated each year. This has evidently yielded good recruitment of seedlings. Fruits ripen and dehisce three to four weeks after pollination.

CONSERVATION STATUS:

Caladenia rosella is in imminent danger of extinction. Only 50-100 plants are now known, and only about six populations have been known to exist in recent times, all at or near the type locality on private property. The only population which still exists for certain is that where the type was collected. Other populations known in recent years have died out as a result of apparently natural mortality or a combination of this, weed invasion, rabbit grazing and activities associated with urbanisation, especially house building. On present trends, weed invasion, especially by the annual grass *Briza maxima* and direct human impacts will cause the destruction of this only known population in a few years. Though the population is maintaining numbers at its core — a result of annual hand pollination — plants on the periphery of the population are being destroyed annually. Apart from hastening the possible extinction of *C. rosella*, this destruction is continually reducing the genetic diversity in the species.

Urgent conservation measures are required involving habitat protection, cultivation including *in vitro* symbiotic seed germination and re-establishment in similar alternative sites.

ETYMOLOGY:

The specific epithet *rosella* is a diminutive of *rosea*, referring to the rose-pink colour.

ACKNOWLEDGEMENTS

I am indebted to Dr George Scott for the Latin diagnoses and to Campbell Beardsell, Cliff Beauglehole, Sarah Bedggood, Bruce Fuhrer, Rhys Griffiths and Dr James Ross for advice and assistance.

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Manuscript received 29 April 1987.

THE BOTANIST JOACHIM STEETZ (1804-1862)

by

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ABSTRACT

Short, P. S. & Sinkora, D. M. The botanist Joachim Steetz (1804-1862). *Muelleria* 6(6): 449-494 (1988). – The private herbarium of the Hamburg botanist Joachim Steetz is housed in the National Herbarium of Victoria (MEL). It was purchased in 1863. Details of the contents of Steetz's Herbarium are provided along with biographical notes and a list of his publications. Over 160 collectors, all listed, contributed specimens from more than 30 countries to Steetz's herbarium. Detailed notes are provided on the collections of N. J. Andersson, N. Binder, J. D. Hooker and T. Thomson, J. W. K. Moritz, W. C. H. Peters, J. L. Preiss, M. R. Schomburgk, B. Seemann, F. W. Sieber, G. T. Siemssen, A. Sinclair and N. S. Turczaninow.

CONTENTS

Introduction	Page	449
Abbreviations		450
Biographical information:		
General	Page	451
Eponymy	453	
Publications		Page 453
Assessment of work		454
Herbarium:		
Acquisition by the National Herbarium of Victoria		457
Content and identification of collections		
A. General		457
B. Flowering Plants		471
C. Ferns		478
D. Algae		482
Notes on contributors and publications:		
N. J. Andersson	Page	482
N. Binder	483	
J. D. Hooker & T. Thomson	483	
J. W. K. Moritz	483	
W. C. H. Peters	484	
J. L. Preiss	485	
M. R. Schomburgk	486	
B. Seemann		Page 487
C. W. Short		487
F. W. Sieber		487
G. T. Siemssen		487
A. Sinclair		488
N. S. Turczaninow		488
Index of contributors to Steetz's herbarium		490
Acknowledgements		492
References		492
Appendix: Steetz's unpublished correspondence		494

INTRODUCTION

With the appointment in 1853 of Ferdinand Mueller to the position of Government Botanist for Victoria the international importance of what is now the National Herbarium of Victoria (MEL) to systematic botany was assured. He actively encouraged botanical exploration in Australia and before his death in 1896 had written over one thousand scientific articles on the Australian flora (Churchill *et al.* 1978, 1984). Mueller also acquired specimens from overseas, either by exchange, donation or departmental purchase. For example he received donations from both Sir William Hooker and Sir Joseph Hooker of Kew, donations which included specimens of the latter's Indian plants. He also had in his keeping the private herbarium of Joachim Steetz and almost the whole of O. W. Sonder's herbarium.

* National Herbarium of Victoria, Birdwood Avenue, South Yarra, Victoria, Australia 3141.

In a memorandum pertaining to the purchase of Sonder's herbarium he noted that it alone was so large that the Melbourne herbarium, "which is so rich in Australian plants, would become equally important in its extra Australian collections" (Mueller 1863a). He subsequently reported that "no region of the globe is unrepresented in the Melbourne Herbarium, and this often by original material not extant in many other places nor now obtainable anywhere" (Mueller 1888, p. 211).

Much information has been compiled by both past and present botanists and technical staff about the holdings of MEL. The contributions by A. B. Court and J. H. Willis are particularly noteworthy. However, the majority of this information, including a general listing of contributions from last century, is as yet unpublished. With the exception of scattered notes to be found in taxonomic revisions the only publications dealing with MEL general holdings of non-Australian plants are notes by Court (1972) on the Sonder herbarium and by Anderson (1971) on Otto Carl Berg's types of Myrtaceae. The library also contains an unpublished report by C. A. Corn (1983) on the MEL holdings of W. Hillebrand's collections from Hawaii. The MEL holdings of Australian plants are comparatively well known, at least by Australian botanists, although much is still to be published and, as with the non-Australian material, just how and when some collections were acquired is still to be resolved.

In this paper we provide details of the herbarium of the Hamburg botanist Joachim Steetz. Steetz published on a number of plant groups, particularly the Compositae, and type collections of many taxa named by him are to be found in MEL. In drawing attention to his herbarium we not only highlight the presence of the type collections but also the fact that the Steetz herbarium is a mine of information for anyone interested in the history of the acquisition of specimens by botanists. Through the auspices of over 160 collectors Steetz was able to acquire specimens from more than 30 countries. Too often we find that herbaria acquired in such a manner are poorly labelled and information as to how a person acquired them can be obtained only indirectly by checking correspondence and publications. To some extent this is true for the Steetz herbarium but in many cases specimens acquired by Steetz are accompanied by meticulous notes. He frequently recorded not just the collector, locality and date of collection but also from whom and when he acquired a specimen. Very often collections were not acquired directly from the collector but through a second or third party. Hence, in the Steetz herbarium, we have a most interesting and useful documentation of the chains of distribution of herbarium specimens by collectors of the early to mid-nineteenth century.

The Steetz herbarium is incorporated in the general holdings of MEL and we lack a computerized record of our holdings. To ascertain the content of the herbarium it was necessary to obtain general information about Steetz from published material and unpublished correspondence housed in other herbaria and libraries. In doing this we naturally came upon considerable biographical information and it is included in this paper.

We realize that we have not examined all data pertaining to Steetz, including publications and unpublished correspondence, and would appreciate receiving additional information from others.

ABBREVIATIONS

Herbaria and associated libraries are referred to in the text by the abbreviations used by Holmgren, Keuken & Schofield (1981).

A: Herbarium, Arnold Arboretum of Harvard University, Cambridge, Massachusetts, U.S.A.

B: Botanischer Garten und Botanisches Museum Berlin-Dahlem, Berlin, Federal Republic of Germany.

BM: Herbarium, British Museum (Natural History), London, England.

BR: Herbarium, Jardin Botanique National de Belgique - Nationale Plantentuin van België, Meise, Belgium.

CGE: Herbarium, University of Cambridge, England.

DNA: Herbarium of the Northern Territory, Darwin, Australia.

EA: East African Herbarium, Nairobi, Kenya.

- G: Herbarium, Conservatoire et Jardin botaniques de la Ville de Genève, Switzerland.
 GH: Gray Herbarium of Harvard University, Cambridge, Massachusetts, U.S.A.
 HAL: Martin-Luther-Universität, Halle, German Democratic Republic.
 HBG: Herbarium, Institut für Allgemeine Botanik und Botanischer Garten, Hamburg, Federal Republic of Germany.
 K: The Herbarium, Royal Botanic Gardens, Kew, England.
 LD: Botanical Museum, Lund, Sweden.
 LE: Herbarium of the Department of Higher Plants, V. L. Komarov Botanical Institute, Leningrad, U.S.S.R.
 MEL: National Herbarium of Victoria, South Yarra, Australia.
 NSW: National Herbarium of New South Wales, Sydney, Australia.
 P: Muséum National d'Histoire Naturelle, Paris, France.
 PERTH: Western Australian Herbarium, Perth, Australia.
 S: Herbarium, Swedish Museum of Natural History, Stockholm, Sweden.
 TCD: Herbarium, Trinity College, Dublin, Ireland.

BIOGRAPHICAL INFORMATION

GENERAL

STEETZ, Joachim. Born 12 November 1804. Died 24 March 1862.

Following Steetz's death in 1862 an unsigned obituary was published in *Bonplandia*. We suspect it came from the pen of Dr. Berthold Seemann (Anonymous 1862), editor of the journal and a long time friend of Steetz. The following is a translation of the obituary from the original German:

"Dr Joachim Steetz, one of the oldest contributors to *Bonplandia*, died on the 24th March after 9 a.m., only 57 years of age. He was a very knowledgeable and versatile man in the fields of the natural sciences as medical doctor, botanist and zoologist. He was born on the 12th November 1804, son of the local merchant Zimbert Joachim Steetz, from 1819 attended school at the Johanneum and from 1824 the Gymnasium academicum in his hometown, then from April 1825 he studied in Halle and from Autumn 1826 Medicine in Würzburg, where he graduated as Doctor of Medicine, Surgery and Obstetrics. He then settled in Hamburg as General Practitioner. As such he worked for more than 30 years, at the same time also as doctor to the destitute and as doctor at the Holy Spirit Hospital. He enjoyed the fullest confidence of the authorities and scholars and the esteem of his fellow citizens. His scientific lectures and his not inconsiderable collection of insects gave an honourable witness to his ability in zoology, for which he equipped himself by 14 years of specialized study. In the field of Botany he was esteemed as a precise systematist. With his many publications he assured himself of an honoured name; his rich herbarium is proof of his activity. He worked mainly on Compositae and in these largely on Asteroideae [Astereae], which held a special attraction for him. He first published on this family in *Pl. Preiss.* vol. 1, where he described several new genera and species, then worked on the plants collected by Dr. B. Seemann, which were published in the latter's work *Bot. voy. Herald*, further also those collected by Prof. Peters in Mozambique, which however he was not able to complete before his death. As well Steetz did the Büttneraceae [Sterculiaceae] in vol. 2 of *Pl. Preiss.* and wrote up the Tremandraceae in a separate publication, as well as numerous other genera and species. Besides these he wrote essays for various botanical and natural history journals. Steetz was a co-founder of the Hamburg Natural History Society and took an active part in their meetings with a number of written contributions and free lectures. For many years he was the Society's correspondence secretary and later its Vice-President. He was a founding member of the Hamburg Horticultural and Floricultural Society, for the past 25 years a member of its administration and for the past eight years Secretary and Editor of its Annual Reports. When the Museum committee was first called together in 1843 he was elected as representative member by the Grammar School Deputation and continued to be re-elected as each term of office expired. For the past 15 years he held the office of minute secretary in this Commission. During legal proceedings

against Professor Lehmann in 1849 the same authority entrusted him with the teaching of Botany at the Academy and the Grammar School as well as the interim Directorship of the Botanic Garden. The following year, after the law suit against Lehmann had been decided in favour of the accused, Steetz received an honourable discharge with grateful acknowledgement of his services to the State. In 1850 he was invited by some of the Professors of the Academic College to assist at the newly founded Teacher's College by taking on the lectures in scientific botany, which he continued to the present without a break. He received backdated confirmation in this position from the authorities in 1858. In his position as lecturer he contributed enormously to improvements in the quality of scientific teaching generally and in botany in particular. In 1855 he was invited to Glasgow by the Committee of the British Association for the Advancement of Science under the Presidency of the Duke of Argyll to their meeting, an honour extended to only 200 foreigners who were scholars in all the various fields of the natural sciences. His visit there proved to have the most favourable consequences for his scientific studies. An equal honour for him was his election as Member to the Imperial L.-C. Academy of Natural Scientists [*Leopoldina*] in 1857 under the name J. E. Smith, as well as membership of a number of other scientific societies in Moscow, Breslau, Mauritius etc. When after the death of Lehmann no botanical or zoological lectures could be scheduled for the timetable of the summer semester he was asked by the Director, following a petition by a number of students, to announce botanical lectures twice a week. Steetz, honoured by this request, accepted most willingly and has continued to fill the gap since then, as the Chair of Botany combined with the Directorship of the Botanic Gardens could not be filled. He also applied as candidate for the Professorial Chair and with his manifold talents and abilities and the practical use he made of them in all the various scientific institutes mentioned above he was well qualified. While his prospects looked favourable he suffered a serious illness, which unfortunately resulted in his early death.

In spite of his demanding and time-consuming profession Dr. Steetz had dedicated his time to the service of science and to a large extent to the intellectual interests of his hometown. But he found full satisfaction in the knowledge of the respect in which he was held by everyone and in the uninterrupted study of his sciences, and that quiet calm, freshness of mind and sunny disposition, which are amongst the first prerogatives for successful studies. He recognized that such continued and consistent striving through a long number of years after the one goal was absolutely necessary to achieve some sort of mastery even in only some part of the natural sciences and to translate the results into practical achievements in life. Here and abroad his benevolent work in Hamburg will remain always in the memory of his many friends."

Schlechtendal's (1862) obituary to Steetz provides little additional information. Neither does an anonymous (1879) entry in an Encyclopaedia of Hamburg authors. However we do learn that Steetz married Johanne Henriette Möller on 23 July 1842. Their first child, a girl, died when not quite three years old. They had two further children, a son and daughter, and both were still living at the time of Steetz's death. It is revealed in Schlechtendal's account that a post mortem showed Steetz to have died of tuberculosis of the lungs and lower abdomen.

A friend of Steetz, G. Theodor Siemssen, acted as trustee for Steetz's widow (see notes on acquisition of herbarium).

Published letters (Steetz 1854b), botanical works and unpublished correspondence reveal that Steetz was skilled in English, French and Latin.

As our interest in Steetz primarily stems from the acquisition by MEL of his herbarium we have not attempted to determine in any detail the extent to which he was involved in entomological studies. However we have included in the list of publications the one work known to us which reflects his interests in entomology. This is an obituary to the entomologist Wilhelm von Winthem. Enquiries on our behalf by Prof. Dr. K. Kubitzki of HBG (in litt. 1986) to Prof. Dr. H. Strümpel

of the Zoological Institute and Museum of Hamburg also revealed that Steetz's entomological collection is considered to have been insignificant. Any specimens housed at the Museum would have been destroyed during an air raid in 1943.

EPONYMY

Steetzia Lehm., Pl. Preiss. 2: 129 (1846).

Steetzia Sonder, Linnaea 25: 450 (1853).

Achyrocline steetzii Vatke, Oesterr. Bot. Z. 27: 194 (1877). — *Helichrysum steetzii* (Vatke) O. Hoffm., Bol. Soc. Brot. 13: 25 (1896).

Aster steetzii F. Muell., Fragm. 5: 66 (1865). — *Olearia steetzii* F. Muell. l.c., pro syn.

Baccharis steetzi Andersson, Kongl. Svenska Vetensk. Akad. Handl. (1853): 177 (1855).

Bothriocline steetziana Wild & Pope, Kirkia 10: 319 (1977).

Eupatorium steetzii Robinson, Proc. Amer. Acad. Arts 55: 36 (1919).

Helichrysum steetzii Tovey & Morris, Proc. Roy. Soc. Vict. 35: 196 (1923).

Nidorella steetzii J.A. Schmidt, Beitr. Fl. Cap. Verd. Ins. 185 (1852).

Senecio steetzii Bolle, Bonplandia 6: 296 (1859).

Sphaeranthus steetzii Oliver & Hiern in Oliver, Fl. Trop. Afr. 3: 273 (1877).

Streptoglossa steetzii F. Muell., Trans. Proc. Bot. Soc. Edinburgh 7: 491 (1863).

Vernonia steetziana Oliver & Hiern in Oliver, Fl. Trop. Afr. 3: 273 (1877).

Waitzia steetziana Lehm., Pl. Preiss. 1: 454 (1845).

Many of the above names are in synonymy and some are illegitimate.

PUBLICATIONS BY STEETZ

Details pertaining to Steetz's entomological work and his publications in local natural history and horticultural journals have been difficult to procure and therefore this list will be incomplete. However we believe that it includes all of his major botanical works. It also includes letters published in German. A summary of their content is included.

1845a. Tremandreae. In Lehmann, J.G.C. (ed.), "Plantae Preissianae" (Hamburg). 1: 211-223. [9-11 Feb. 1845.]

1845b. Compositae. In Lehmann op. cit. 1: 417-490. [pp. 417-480, 14-16 Aug.; pp. 481-490, 3-5 Nov. Reprinted as "Enumeratio plantarum quas in Australasia annis 1838-1841 collegit L. Preiss. Compositae . . . s.l.n.d.", n.v., see Stafleu & Cowan 1985.]

1847. "Revisio generis Comesperma Labill. et synopsis Lasiopetalearum et Büttneriearum in Nova Hollandia indigenarum." (Hamburg). [Preprint of Lehmann op. cit. 2: 291-315, 316-317 (?-367, including *Fleischeria*) (2-5 Aug. 1848) n.v., see Stafleu & Cowan 1985.]

1848. Nekrolog. *Entomol. Zeitung* 9(7): 194-198. – Obituary of W. von Winthem (1799-1847).

1853. "Die Familie der Tremandreen und ihre Verwandtschaft zu der Familie der Lasiopetaleen." (Hamburg). [Sept.-Oct. 1853.]

1854a. Compositae. In Seemann, B. (ed.), "The botany of the voyage of H.M.S. Herald" (Lovell Reeve: London). pp. 139-160. [Feb. 1854; part of the "Flora of the Isthmus of Panama".]

1854b. Ein deutsches Urtheil über eine englische Kritik. *Bonplandia* 2(14): 169-170. [15 July 1854.] – Titled "A German opinion of an English criticism" this letter was written as the result of a book notice in *Gard. Chron.* 1854 (No. 16): 255 in which Steetz was criticised for his long Latin descriptions. Steetz gives reasons for his approach.

1854c. *Trigonopterum* Steetz in Andersson, Kongl. Vetensk. Acad. Handl. 1853: 183 (1854). [c. 7 Sept. 1854.]

1854d. Dr Steetz über den Begriff von Species. *Bonplandia* 2(21): 244-246. [1 Nov. 1854.] – Steetz discusses the species concept.

1854e. Zurückweisung, Dem Redacteur der 'Bonplandia'. *Bonplandia* 2(21): 246-247. [1 Nov. 1854.] – A repudiation to the editor of *Bonplandia*. In *Bonplandia* 2(16): 188-189 (15 Aug. 1854) an anonymous German ('X') criticized Steetz for his use of Latin and long descriptions. Steetz suggests that it is a misuse of the press when a person can criticize a letter under the cloak of anonymity. He felt it was cowardice on the part of 'X', which was unworthy of a German. In a subsequent letter to *Bonplandia* 2(23): 284 (1 Dec 1854) 'X' felt that Steetz's reply was insulting, again attacked Steetz and said that the name of the signatory was irrelevant.

- 1855a. Fried. E. L. von Fischer. *Bonplandia* 3(2): 18-21. [1 Feb. 1855.] – Obituary of F.E.L. von Fischer (1782-1854).
- 1855b. Gardeners' Chronicle's 'Bad German habit'. Dem Redacteur der Bonplandia. *Bonplandia* 3(11): 147-155. [15 June 1855.] – Long letter by Steetz again defending the use of Latin and long descriptions. This followed another article in *Gard. Chron.* 1854: 804 (16 Dec. 1854). Editorials on the same subject appeared in *Bonplandia* 3(1): 1-2 (15 Jan. 1854) & 3(11): 141-142 (15 June 1855).
- 1855c. Replik. Dem Redacteur der Bonplandia. *Bonplandia* 3(13&14): 203-205. [15 July 1855.] – Defence by Steetz of his last article. The editorial in *Bonplandia* 3(11): 141-142 suggested that Steetz was guilty of a few breaches of etiquette, particularly in his criticism of Lindley, whom he believed to be the author of the articles in *Gard. Chron.*
1856. Klotzsch's Angreifer. Dem Redacteur der Bonplandia. *Bonplandia* 4(17): 280-281. [1 Sept. 1856.] – An article in the *Hamburger Garten- und Blumenzeitung* (8 March 1856) attacked Klotzsch's work on the Begoniaceae. The writer signed as "N.N.". Steetz cites from a letter he received from Klotzsch in which it is suggested the anonymous writer is the same person who attacked Steetz. Asks that the anonymous writer be revealed.
- 1857a. Klotzsch's Begoniaceen. Dem Redacteur der Bonplandia. *Bonplandia* 5(4): 60-65. [1 March 1857.] – A letter to the editor (Seemann) expressing astonishment that the writer of the anonymous letters has not been revealed in *Bonplandia*. Again suggests that he should be.
- 1857b. Compositae. In Seemann, B. *op. cit.* pp. 384-395. [Jan.-Jun. 1857; part of the "Flora of the Island of Hongkong".]
- 1857c. *Duhaldea Chinensis*, De Cand. Ein Beitrag zur Systematik der Compositae. *Bonplandia* 5(19) & 20: 305-310. [1 Nov. 1857.]
1858. *Elvira biflora*, DC. und *Unxia digyna*, Steetz. Dem Redacteur der Bonplandia. *Bonplandia* 128-131. [15 April 1858.]
1863. *Streptoglossa* Steetz in F. Muell, *Trans. Bot. Soc. Edinburgh* 7: 492-495.
1864. Compositae. In Peters, W. C. H. (ed.), "Naturwissenschaftliche Reise nach Mossambique" (Berlin). 6: 305-500.

ASSESSMENT OF STEETZ'S BOTANICAL WORK

Steetz had very strong views on taxonomic procedure. For example, in a letter to J. D. Hooker (8 November 1856, K) he stated in part:

"Moreover you speak of your intention to make me partake of the further distribution of your precious Indian plants . . . I fully comprehend what you say about your provisional identifications. I know the difficulties, which arise within the careful examination of every order of great extension, because many of them still want a sound basis at time. Even the great order of Compositae, so well worked up by Cassini, Lessing and de Candolle, needs a careful revision. Every detection of an erroneous principle in distributing Tribus, genera and species requires a great sacrifice of time, because it is then necessary, to re-examine a great deal of so named good or well known species. Most of the errors are committed by the first publisher and then they have been repeated from one author to another. Such errors exist copiously even in the Floras of our own countries, and are perpetuated by so many compilers. So Dr. Reichenbach fil. just now has showed that *Nigritella angustifolia* Rich. is a true *Gymnadenia*, and Dr. Alefeld has at first seen, the characteristic nectariferous glands in our *Pyrola secunda* L. It is true the ignorances of such differences in the structure of the flower does not prevent to recognize a plant so well known, for every plant has its proper habit, which everytime coincides with his essential characters. But for stating the principles in confining natural orders, tribus, genera and species it is necessary to examine accurately every part of the flower and fruit. Such principles, concerning the whole of the vegetable Kingdom still fail, because the different orders are not worked up in an homogeneous manner,

and the affinity of each is not found out in a satisfactory degree. Therefore your extensive introductory essay, and your remarks to every order, and every genus, which I admire in the first Volume of your excellent *Flora Indica* are a real advancement in science, and I expect anxious[ly] the continuation of this valuable work, as I find in it often the answer to such questions. The science of our present time is not contented with the faculty of naming some thousand plants, of propagating errors by compilation, or of making species beyond of all reason. Our systematic Botany requires the accuratest examination of not only of every part of a plant but also with regard of its allies for the purification of our natural system, particularly of the hitherto neglected orders of it, and so to find out the general law for mutual affinity, which till now is still a 'pium desiderium'. Indeed, many botanists, who are wanting the necessary literary materials and a large Herbarium with original specimens, but who have time enough to herbarize in their vicinity, would do better, to study the plants in their own *Flora* with accuracy, than to describe exotic plants and to much multiply, as so often occurs, the great dust of synonymy in Botany. In this way, I should think, they would satisfy as well as to themselves, as to the claims of science."[(C)RBG Kew]

Steetz's conviction that detailed Latin descriptions of new species, often accompanied by explanatory notes, are preferable to diagnoses led to considerable public conflict. Shortly after publication of Steetz's (1854a) treatise on the Compositae of Panama there appeared a note in *Gardeners' Chronicle* in which the author (Anonymous, 1854a) criticized Steetz for having "The bad German habit of attaching to every supposed novelty a long Latin description, four-fifths of which are superfluous". Steetz (1854b) defended his approach but in August of that year another anonymous author, a German botanist signing as 'X', also criticized him for the same reasons. This marked the beginning of a series of often scathing letters in *Bonplandia* by Steetz and other botanists, including the anonymous 'X'. Full reference to the articles are given in Sinkora & Short (1987). Although the articles primarily revolve around the same theme, that of descriptive format, Steetz does discuss taxonomic procedure in general terms (Steetz 1855b) and the problem of deciding generic limits also arose when the anonymous writer attacked J. F. Klotzsch for his recognition of numerous segregate genera in *Begonia* L. Our (Sinkora & Short, 1987) separate report of this conflict, published because of both its botanical interest and the personality clashes involved, includes usually full translations into English of the letters published in *Bonplandia* plus copies of other publications applicable to the arguments put forward by Steetz, his supporters and his adversaries. The conflict seems to have been laid to rest, at least publicly, with an editorial in *Bonplandia* (Anonymous, 1857). The article suggests that the anonymous letter writer was J. G. C. Lehmann.

Steetz's penchant for detailed descriptions was to some extent a result of his meticulous nature, which is evident from the way in which he labelled herbarium specimens, and his verbose manner of writing, evident in his many letters. However he was primarily concerned with making accurate identifications of plants easier, an approach which is surely commendable.

The above conflict shows that Steetz was a meticulous observer but sheds little light on the acceptability or otherwise of his taxonomic work. As noted by Steetz (1854d) the concept of a plant species is a purely human one. It follows that concepts of species and other taxa are very much a matter of opinion. Even if theoretical concepts are agreed upon, the limits of taxa as perceived at one point in time may well be re-defined as more and better collections become available and experimental work is carried out to establish the effect of environmental parameters on plant morphology. Steetz was aware of these problems but even if he was not it is only fair that in assessing a past botanist's work the views of his contemporaries should be given much consideration.

Steetz's taxonomic work was generally well regarded by contemporary botanists and it is to his credit that in more modern treatments a considerable number of taxa described by him are maintained.

Despite the adverse comments by others on the length of his descriptions Steetz's (1854a) work on the Compositae of Panama was otherwise well received by contemporary taxonomists. In his review of the work the author (Anonymous, 1854a) who criticized Steetz for his "bad German habit" also referred to the "real talent" of the German botanists. In a subsequent note (Anonymous, 1854b) on the same matter the author said, of Steetz, that he "really had no intention to say anything disagreeable to the learned gentleman" (p. 804). His negative comments only pertained to the descriptive format. (The anonymous author of the articles in *Gardeners' Chronicle* was believed by Steetz to be John Lindley, editor of the journal). Fűrnrrohr (1854), writing about the same work, was similarly complementary to Steetz, referring to him as an accurate research worker. In his treatment Steetz recognised one new genus and 11 new species. Treatments in Woodson *et al.* (1975) have five of Steetz's species in synonymy and two transferred from where Steetz placed them in *Eupatorium* L. to *Ayapana* Spach.

Steetz's (1853) paper on the affinities of the Tremandraceae ("Tremandreae") and the Sterculiaceae ("Lasiopetaleae") was also well received. An anonymous author (1854c) noted that "The whole subject is argued in a satisfactory, though perhaps rather diffuse manner" (p. 60). In a letter to Bentham (21 August 1854, K) Steetz thanked him for "judging with the greatest indulgence my little pamphlet on the affinities of Tremandreae and Lasiopetaleae". Schlechtendal (1853) praised the work, and an unsigned review of the work in *Bonplandia*, probably by Seemann (Anonymous 1854e) the editor, was also complimentary, noting that Steetz was one of the most discerning, specialised systematists. The anonymous author was, however, critical of the length of the work and the lack of consideration of Robert Brown's work, the latter believing the "Tremandreae" to belong to the "Polygalae". Cronquist (1981) refers the Tremandraceae to the order Polygalales, the Sterculiaceae to the Malvales.

Steetz's work on the Tremandraceae, Sterculiaceae and *Comesperma* for *Pl. Preiss.* were not substantially modified by Bentham (1863 a,b,c). His treatment of *Tetradthea* Sm. however does not agree well with Thompson's (1976) treatment of the genus although given the variable nature of *T. hirsuta* Lindl., to which Thompson refers three of Steetz's species and two of his varieties, this is understandable. In contrast to his treatment of the afore-mentioned groups, Steetz's (1845b) treatment of the Compositae suffered extensive modification at the hands of Bentham (1867), particularly in regard to generic concepts. However, Bentham's classification of the Australian Compositae, particularly the Inuleae, was at variance with those of other contemporary botanists, including Asa Gray and Nicolai Turczaninow. Both of these botanists had similar generic concepts to Steetz and recent work (Short 1983, 1986) supports their views. The Australian genus *Streptoglossa* Steetz (Compositae: Inuleae), published posthumously in a work by Mueller (1863), is still recognised.

Steetz's final major work, that of the Compositae in Peter's *Naturw. Reise Mossambique* has proved to be the most unaccepted one. We have not seen any contemporary reviews but it is evident from the works by Wild (1967, 1969, 1975, 1978, 1980), Jeffrey (1968), Pope (1975) and Wild & Pope (1977a,b) that the majority of the species described as new by Steetz have been placed in synonymy. Similarly only three of the genera described in that work for the first time are currently recognised, i.e. *Adelostigma*, *Hypericophyllum* and *Pleiotaxis*. Six of his genera are commonly reduced to synonymy under *Vernonia* Schreb. although Merxmüller (1954) recognised *Gongrothaminus* Steetz. *Vernonia* includes about 1000 species and generic limits in the Vernoniaeae are yet to be satisfactorily resolved (Jones 1977), so it is perhaps not surprising that Steetz's work in this group has not been accepted as well as that in other groups.

The reviewer (Anonymous, 1854c) of Steetz's (1853) work on the Tremandraceae and Sterculiaceae said that Steetz was a botanist "who devote[d] the few leisure moments his profession afford[ed] to the pursuit of his favourite study of botany with great zeal and success" (p. 59). We must concur with these sentiments.

HERBARIUM

ACQUISITION OF STEETZ'S HERBARIUM BY THE NATIONAL HERBARIUM OF VICTORIA

Mueller (1888, p. 212), in a general article about the Melbourne Herbarium, stated that in "about 1859 Dr Steetz's important collections were added by departmental purchase". However this date is erroneous. Steetz's herbarium was not obtained until after his death in March 1862. In an unpublished memorandum to the Chief Secretary, dated 31 March 1863, Mueller (1863a) said:

"I have the honour to solicit that you will be pleased to place at the disposal of the Agent General of Victoria in London the sum of 80''''- (eighty pounds Sterling), out of the vote for purchase of plants, for which, if it meets with your approval, I am desirous to secure for the museum of the botanic Garden the whole collection of dried plants formed by the late celebrated Dr. Steetz of Hamburg, comprising fifteen large cases. These collections will be highly valuable for facilitating the scientific work of my office, and form a permanent important addition to our collections at very moderate costs.

Should you be pleased to approve my suggestion I would beg to request that the sum (above named) may be rendered available through the Agent General to G. T. Siemssen Esq. of Hamburg, the trustee of the widow of Dr. Steetz."

Subsequent internal Departmental memoranda or reports by Mueller relating to the Steetz herbarium have not been located but, in a letter to George Bentham (dated 12 December 1863) Mueller (1863c) wrote that he had received the herbarium. He said in part:

"Had I been so fortunate to possess earlier the herbarium of the late Dr. Steetz, which I purchased, it would have rendered my work amongst the Myrtaceae in general easier & safer and in [words illegible] in all the investigations of West Austral. plants because the collections of my late friend contains *a very rich set of Preissian plants*. I received this treasure only last week and was doubtful whether I should send the Preissian Leguminosae and Myrtaceae at once also. I have retained them however for the present, for if you consult Sonder's set, it will be an unnecessary risk to send Steetz's set also; if you however desire them they shall be forwarded to you also. As however the whole of the Steetzian herbarium will be incorporated, you will receive in future the Preissian & Sieberian specimens along with the rest. The Steetzian Collection advances my herbarium considerably in species & particularly in specimens. As Steetz collected for more than 30 years he accumulated a good many valuable plants, to which he seems to have added many of Professor Lehmann's relicts. The herbarium is *extremely rich in Ecklon & Zeyher plants*, also Moritz's [= Moritz's] South American collections, Vahls arctic plants, Turczaninow's Russian, Rochel plants of the Banat, and many other important . . . [bottom line illegible on microfilm, absent on photocopy]. . . Short's North American collections. In all it contains 418 packages so that my herbarium approaches near to 2,000 fascicles . . ."

Thus it has been established that Steetz's herbarium was acquired in 1863, apparently reaching Melbourne in December of that year.

CONTENT AND IDENTIFICATION OF COLLECTIONS

A. GENERAL (tables 1 to 5)

The National Herbarium of Victoria contains in excess of one million specimens. Scattered amongst these are the collections that once constituted the Steetz herbarium. As we have no detailed documentation of its original content it was necessary to generally survey our holdings for Steetz specimens. Our perusal of published works and the examination of correspondence between Steetz and other botanists (held at GH, HAL, K, MEL etc., see appendix) also helped in this task. As Steetz was particularly interested in the Compositae much time was spent examining our collections of this family.

The total size, i.e. the number of collections, of the Steetz herbarium is unknown, Mueller (1863b) only noting that it consisted of 15 large packing cases.

Table 1. Examples of Australian flowering plant collections in the Steetz Herbarium.

An * preceding a MEL number indicates that the collection is, or is possibly, a type.

ORIGINAL SOURCE	STEETZ LABEL	TAXON	MEL NUMBER
Bauer, F.L. (1760-1826)	"In Novae Hollandiae ora intra tropicum, prope flumen Endeavour leg. cl. Ferd. Bauer, recepi e herbario palatino Vindobonensi, 1847."	<i>Comesperma secundum</i> Banks ex DC.	*1539806
Blandowski, J.W.T.L. (1822-c. 1880)	"Helichrysum Blandowskianum mihi. mss. Port Adelaide. Coromandel Valley ad Sturt-River. leg. Blandowsky. N. 178."	<i>Helichrysum blandowskianum</i> Steetz ex Sonder	*1544518
"	"Inter Port Adelaide et Hahndorf. 22 Sept. 1849 leg. Blandowsky misit 1850."	<i>Cyclagyne canescens</i> Benth. (= <i>Swainsona oroboides</i> F. Muell. ex Benth.)	1544516
Drummond, J. (1784-1863)	"In Nova Hollandia, ad flumen Swan-River leg. cl. Drummond, collectieus No. 106, misit amicus cl. Turczaninow ipse, 1848."	<i>Thomasia triloba</i> Turcz.	*1539808
"	"1852" original label "Nova Hollandia. Drummond coll. IV n. 199" in unknown hand. Presumably ex herb Turczaninow.	<i>Helipterum chlorocephalum</i> (Turcz.) Benth.	*109148
Gunn, R.C. (1808-1881)	"In insula van Diemen leg. cl. Gunn, emi a Leiboldt, qui plantain ex Anglia attulit, sine nomine, 1884."	<i>Drosera binata</i> Labill.	96182
"	"In insula van Diemen leg. cl. Gunn. (Herb. Gunnian. No. 510) misit cl. Hooker, ded. amicus cl. Zuccarini, 1844."	<i>Lagenophora gunniana</i> Steetz (= <i>Lagenifera huegelii</i> Benth.)	*1543542
Labillardière, J.J. H. de (1775-1834)	"In insula van Diemen leg. cl. Labillardière ipse! specimina haece authentica benevole mecum communicavit amicus cl. Sonder, 1843."	<i>Leptorhynchos squamatus</i> (Labill.) Lessing	*1543432
Lawrence, R.W. (1807-1833)	"In insula van Diemen leg. cl. Lawrence, misit cl. Hooker, ded. amicissimus cl. Beatus Zuccarini, 1844."	<i>Leptorhynchos squamatus</i> (Labill.) Lessing	1543432
Leiboldt Preiss, J.L. (1811-1883)	"In insula van Diemen lectam en Anglia attulit Leiboldt; emi 1844."	<i>Tetralthea pilosa</i> Labill.	1007960
"	"In Nova Hollandia, (Swan-River Colonia) in arenosis ad fluvium Cygnorum leg. cl. Preiss. (Herb. Preiss. No. 13.) emi 1843."	<i>Waitzia corymbosa</i> Wendl var. <i>wendlandiana</i> Steetz	*1539406
"	"In Nova Hollandia, (Swan-River Colonia) in limosis porrectis illustribus sylvae haud procul a praedio rustico cl. J. Moore, terrae superioris leg. cl. Preiss. (Herb. Preiss. N. 72) emi 1843."	<i>Siemsenia capillaris</i> Steetz [= <i>Podolepis capillaris</i> (Steetz) Diels]	*1539405
"	"In Nova Hollandia australi-occidentali cis fluvium Gordon leg. cl. Dr. Preiss. (Herb. Preiss. N. 209) emi 1843."	<i>Calothamnus preissii</i> Schauer	*1542050
"	"In Nova Hollandia, (Swan River Colonia, prope Albany) leg. cl. Dr. Preiss. (Herb. Preiss. N. 838) emi 1843."	<i>Pultenaea aspalathoides</i> Meissner	*35088
"	"In rupestris ad fluvium Canning (Darlings' range) in Nova Hollandia australi, leg. cl. Dr. Preiss; emi 1843. (Herb. Preiss. N. 1027.)"	<i>Labichea diversifolia</i> Meissner [= <i>L. lanceolata</i> Benth. ssp. <i>diversifolia</i> (Meissner) J.H. Ross]	*626657
"	"In arenosis sylvae ad sinum regis Georgii III in Nova Hollandia occidentali mense Octobr. 1840 leg. cl. Preiss; emi 1843."	<i>Tetralthea hispidissima</i> Steetz	*1007872
"	Numbered as "1316" on separate label.		
"	"In Nova Hollandia (Swan-River Colonia) in umbrosis saxosis ad montem Mathilde, distr. York. leg. cl. Preiss. (Herb. Preiss. N. 1662) emi 1843."	<i>Fleischeria pubens</i> Steudel (= <i>Sida calyxhymenia</i> Gay ex DC.)	*47656

"	"In Nova Hollandia, ad flumen Swan-River, locis arenosis umbrosis sylvae prope oppidulum Perth. d. 13 Maji 1839 leg. cl. Dr. Preiss. (Herb. Preiss N. 1987) emi 1843." Type of <i>D. primulaea</i> Schlott.	<i>Drosera erythrorhiza</i> Lindley	*96246
"	"16. <i>Hibbertia montana</i> Steudel." Numbered as "2135" on separate label.	<i>Hibbertia montana</i> Steudel	*612821
"	"In Nova Hollandia, (Swan River Colonia, in planitie arenosa Quangen, distr. Victoria) leg. cl. Dr. Preiss. (Herb. Preiss. N. 2438) emi 1843."	<i>Dodonaea pinifolia</i> Miq.	*84125
Sieber, F.W. (1789-1844)	"In Nova Hollandia leg. Sieber; emi ab amico Ecklon, 1836." Fl. mixta No. 627.	<i>Diuris elongata</i> Sw. (= <i>D. punctata</i> Smith)	1542041
Siemssen, G.T.	"In insula Diemen prope Hobart-Town leg. deditque amicissimus Theodor Siemssen, 1838; (sine nomine)."	<i>Eurybia ericoides</i> Steetz [= <i>Olearia ericoides</i> (Steetz) N.A. Wakefield]	*1539804
"	"In Nova Hollandia lectam attulit amicissimus Theodor Siemssen e Port-Jackson, mecumque communicavit sine nomine, 1838" & "e Nova Hollandia (Port Jackson)."	<i>Aster siemsseni</i> F. Muell. [= <i>Olearia viscidula</i> (F. Muell.) Benth.]	*1543224 & *1543223
"	"In Nova Hollandia australi ad Port Adelaide leg. deditque amicus Theodor Siemssen, 1839."	<i>Stenanthera conostephioides</i> Sonder [= <i>Astroloma conostephioides</i> (Sonder) Benth.]	*658098
Cultivated	"In horto Berolinensi cultam, recepi e herbario Kohlmeyeriano, sub falso 'Thomasinae quercifoliae' nomine, emi 1837."	<i>Thomasia solanacea</i> Gay	1539807
"	"In horto Halensi cultam, ded. amicus Morsch, 1826."	<i>Thomasia solanacea</i> Gay	1539807
"	"Ramulus <i>Waitzia corymbosae</i> Wendland. ex specimine unico authentico, a cl. auctore ipso in horto Herrenhusano culto, quem cl. Wendland filius ex herbario patris ipsius benevole communicavit, 1844."	<i>Waitzia corymbosa</i> Wendl.	*1539406

Table 2. Examples of Non-Australian flowering plant collections in the Steetz Herbarium.
An * preceding a MEL number indicates that the collection is, or is possibly, a type.

COUNTRY	ORIGINAL SOURCE	STEETZ LABEL	TAXON	MEL NUMBER
Austria	Bartling, F.G. (1798-1875) Hoppe, D.H. (1760-1846)	"flor. austriacae herbar, ded. Dr. Comien 1833." A label, in unknown hand, has Bartling as the collector. "1850." Label in Buek's hand with "L. in alpe Pasterze e manu Hoppe/J. N. Buek" Also blue label with "Dr. Steetz Herb."	<i>Viola alpina</i> Jacq. <i>Hieracium murorum</i> L.	1542940 681772
Brazil	Sieber, F.W. (1789-1844) Nonnenprediger	"in alpe Glockner Carinthiae leg. cl. Sieber, emi ab amico Ecklon, 1836." No. 462 on Sieber label, perhaps Florae austriacae. "prope Rio Janeiro in Brasilia leg. cl. Nonnenprediger ded. amicus Dr. Buek 1838."	<i>Anemone baldensis</i> L. <i>Vernonia discolor</i> Less.	1540823 1542047
Canada	Martin Meatzel Weiz, S.	"Therum examinada! ded. Pastor Wenck, 1855. Okak in Labrador leg. cl. Martin." "videtur var. sepalis 5 (non 6)." Label in unknown hand has "Hebron. Labrador. ex herbar. Wenck. leg. cl. Meatzel." "Prope Okak in Labrador leg. Weiz ded. Wenck 1855."	<i>Anemone borealis</i> Richards (= <i>A. parviflora</i> Michx.) <i>Anemone borealis</i> Richards (= <i>A. parviflora</i> Michx.) <i>Erigeron droebachensis</i> Mueller (= <i>E. acris</i> L.)	1540818 1540818 681766
Chile	Philippi, ?F. or R.A.	"Philippi 1858." Label, in unknown hand, has "In maritimis prov. Valparaiso."	<i>Senecio bahioides</i> Hook. & Arn.	1541369
China	Siemssen, G.T.	"Heliophyllum indicum Cand. / Cand. prod. T. 9 p.556 No. 21. Comp. icon." Label, in unknown hand, has "Canton, 1850. Th. Siemssen."	<i>Heliotropium indicum</i> L.	1543863
Columbia	Moritz, J.W.K. (1797-1866) " Otto, C.F.E. (1812-1885)	Labeled, in unknown hand, "Dr. Steetz Herb." Also with labels in the hands of Klotzsch and Moritz. "In Columbia Americae aequi noctialis, provincia a Merida leg. cl. Moritz, (herb. Moritz No. 1426) emi ab amico Thorey, s.n. <i>Pectis</i> . 1846." "Label, in unknown hand, with "1106. <i>Elephantopus tomentosus</i> L. Columbia. E. Otto." Blue label with "Dr. Steetz Herb."	<i>Aster marginatus</i> Kunth. <i>Pectis elongata</i> Kunth.	1540815 1545429
Cuba	Gundlach, J.C. (1810-1896)	"In insula Cuba, prope Matanzas leg. Dr. Gundlach; determinavit distribuitque s. numero 121 cl. v. Schlechtendal, recepi 1848."	<i>Elephantopus tomentosus</i> L.	1545426
Czechoslovakia	Wimmer, ? C.F.H. (1803-1868)	"1855." Label in Buek's hand with "L. alte Schles. Baude in Sudetis e manu Wimmer./ J.N. Buek." Also blue label with "Dr. Steetz Herb."	<i>Wedelia carnosae</i> Pers.	1542045
Egypt	Sieber, F.W. (1789-1844)	"flor Aegyptiaca (Damiette) leg. Sieber ded. Dr. Buek. 1835."	<i>Hieracium sudeticum</i> Tausch	681775
Ethiopia	Schimper, G.H.W. (1804-1878)	"in Abyssinia leg. cl. Schimper."	<i>Utricularia inflata</i> Forsskal <i>Sphaeranthus angustifolius</i> DC.	90285 1542029

Schmidt, J.A. (1823-1905)		"Schmidt 1851." Label in Schmidt's hand with "In der Gartenschenke bei Göttingen, Juni 50, J.A. Schmidt."	<i>Hieracium pratense</i> Tausch	681779
Sonder, O.W. (1812-1881)		"Specimen hoc prope Hamburgum ad ripam Albes leg. deditque amicus cl. Sonder, 1850. (Verisimiliter ex horto effugitum.)"	<i>Aster</i> sp.	1539427
"		"prope Hamburgum ad ripam Albes (Unweit Teufelsbrücke) legit deditque amicissimus Sonder, 1840."	<i>Aster salignus</i> Willd.	1540801
Steetz, J. (1804-1862)		"ipse legi exemplaria duo prope Hamburgum in paludosis turfosis Eppendorffii posi. die 27 Julii 1835."	<i>Utricularia intermedia</i> Hayne	90303
Thorey		"Thorey 1838." Label in unknown hand with "Hieracium praealtum Will./ florentinum Willd.?/ Katzenstein."	<i>Hieracium praealtum</i> Vill. ex Gochnat	681778
Treviranus, L.C. (1779-1864)		"in valle Ahrthal, haud procul a Bonn ad Rhenum leg. cl. Prof. Treviranus (in Bonn) mecumque benevole communicavit 1840."	<i>Lynosyris vulgaris</i> Cass. ex Less. [= <i>Aster lynosyris</i> (L.) Bernh.]	1540814
Weihe, C.E.A. (1779-1834)		"in Guessthalia prope Herford leg. cl. Weihe; recepti e herbario Kohlmeieriano, 1837."	<i>Erigeron acris</i> L.	681758
Cultivated		"in horto Halensis cultum ded. amicus Schlüter, 1826."	<i>Aster tradescanti</i> L.	1539426
"		"in horto Hamburgensis cultum recepti e herbario amici Milde, 1835."	<i>Aster tarifflorus</i> L.	1539420
"		Labelled in unknown hand with "B. G. Hamb. 1827." Also with "Dr. Steetz Herb."	<i>Aster tradescanti</i> L.	1539425
Spruner, W. von (1805-1874)	Greece	"In Gracia prope Naupliam leg. cl. von Spruner, misitque 1846."	<i>Anemone hortensis</i> L.	1540825
Achtaich	Greenland	"in Groenlandia leg. cl. Achtaich."	<i>Antennaria alpina</i> Gaertn.	1547424
Vahl, J.L.M. (1796-1854)		"In Groenlandia detexit, leg. mecumque benevole communicavit amicus cl. Vahl filius, 1842."	<i>Taraxacum phymatocarpum</i> J. Vahl	*1538841
Schomburgk, M.R. (1811-1890)	Guyana	"in Guiana anglica, ad ripas fluminis Essequib leg. cl. Rich. Schomburgk mecumque benevole communicavit e herb. Berol. amicus Klotzsch, 1853."	<i>Unxia camphorata</i> L.f. [= <i>Melampodium camphorata</i> (L.f.) Benth.]	1550999
"		Blue label with "Dr. Steetz Herb." in unknown hand. Original label, in unknown hand, with "1033. Pterocaulon alopecuroides De Cand. Guiana angl. Rich. Schomburgk."	<i>Pterocaulon virgatum</i> DC	1542030
Hance, H.F. (1827-1886)	Hong Kong	"prope Hong Kong leg. cl. Hance, ded. Seemann, 1857."	<i>Vernonia solanifolia</i> Benth.	677433
Luetckens		"in Hong Kong leg. cl. Luetckens ded. Kohlmeier, 1858."	<i>Blumea crinita</i> Arn.	611796
Frivaldszky von Frivald, E. (1799-1870)	Hungary	"Prope Hortiath in Rumelia leg. cl. Frivaldszky, emi ab amicissimo cl. Rochel, 1841."	<i>Anemone apennina</i> L.	1540816
Hochstetter, C.F. (1787-1860)		"In Hungaria sive Mähren prope Monitz lectam misit beatus collector as Hochstetter."	<i>Tripolium vulgare</i> Nees (= <i>Aster tripolium</i> L.)	1540796
Hartlinsky Rochel, A. (1770-1847)		"in Hungaria prope Störnberg, leg. cl. Hartlinsky." "In Hungaria circa Gikos in Comitatu Perthinensi in arenosis sylvaticus leg. misitque cl. Rochel 1841."	<i>Antennaria carpathica</i> R.Br. <i>Helichrysum arenarium</i> Moench.	1547423 1539418

India	Thomson, T. (1817-1878) Wallich, N. (1786-1854) Unknown Werner	“‘1856.’” Printed label with handwritten locality “Kashmir”. Fig. 6. “‘e specimene Wallich.’” “‘Blumea glandulosa Cand. in eadem folio sine numero.’” Also label with “East India. Dr. Steetz Herb.” Fig. 3. “‘In insula Java, prope Semarang leg. amicus Werner, dedique sine nomine, 1846.’” “‘prope Viennam leg. cl. Dolliner, ded. amicissimus Sonder, 1840.’” “‘In Italia leg. dedique amicus cl. Kützing, s.n. Gnaphal. angustifolii 1846.’” “‘Prope Sorento in Italia inferiori leg. amicus Milde die XXIV mensis Maji 1831; recepi e herbario ipsius, 1835.’” “‘in insula Sardinia leg. cl. Müller, emi a Dr. Hübener, 1835.’” Accompanied by printed label with “‘In agris prope Cagliari Sardiniae. Febr. U.I. Müller.’” “‘Prope Ajaccio in insula Corsica leg. cl. Salzmann, recepi e herbario amici Milde, 1835.’” “‘Leybold, 1855.’” Original label in unknown hand with “‘Gnaphal. carpathic./ Schleeren 6000’/ Dol./ G. Seelos.’” “‘Prope Bastia in insula Corsica leg. cl. Sieber, ded. amicus Bockmann, 1838.’” “‘in insula Corsica leg. cl. Sieber; emi ab amico Ecklon, 1836.’” “‘In Istria australis leg. cl. Tommasini, ded. amicus cl. Sonder, 1841.’” “‘In Macedonia leg. cl. Frivaldszky, emi ab amico Ecklon s.n. ‘Bacharis viscosa’ 1836.’” “‘in insula Mauritius leg. cl. Sieber; emi ab amico Ecklon s.n. ‘Bacharis viscosa’ 1836.’” “‘In Mexico prope Mirador in Savannis, altitudinae pedum 3500 leg. amicus cel. Liebmann, necumque benevole communicavit, 1845, sine nomine.’” “‘Capitula dissecta. Epaltes ? mexicanae Lessing. e speciminae authentica.’” “‘1856.’” Label, possibly in Schultz-Bip.’s hand, with “Mexico auf sonnigem Sandboden um San Augustin del Palmar, Sept. 1854: Schaffner.” “‘e speciminae a cl. Broussonet circa Mogador lecto, a cl. Alph. de Candolle, fil. mique benevole communicata.’” “‘No. 25. hb. Peters. Nidorella microcephala mihi.’”	<i>Anemone falconeri</i> Thomson <i>Epaltes pygmaea</i> DC. <i>Blumea glandulosa</i> DC. (= <i>B. lacera</i> DC.) <i>Sphaeranthus microcephalus</i> Willd. (= <i>S. phenocleoides</i> Oliver & Hiern) <i>Anemone hackelii</i> Steudel (= <i>A. halleri</i> All.) <i>Helichrysium angustifolium</i> DC. <i>Helichrysium angustifolium</i> DC. <i>Anemone coronaria</i> L. <i>Helichrysium angustifolium</i> DC. <i>Helichrysium angustifolium</i> DC. <i>Antennaria carpathica</i> R. Br. <i>Helichrysium angustifolium</i> R. Br. <i>Anemone hortensis</i> L. <i>Anemone hortensis</i> L. <i>Anemone hortensis</i> L. <i>Psadia balsamica</i> DC. (= <i>P. trinervia</i> Willd.) <i>Vernonia leiocarpa</i> DC. <i>Epaltes mexicana</i> Less. <i>Stevia puctata</i> Schultz-Bip. (= <i>S. serrata</i> Cav.) <i>Nolletia chrysocomoides</i> (Desf.) Cass. <i>Nidorella microcephala</i> Steetz	*1540821 1542028 611821 1542043 1540824 1539412 1539414 1540822 1539430 1547422 1539430 1540826 1540826 1540826 1542044 1542027 *1542049 681759 1546647 *1542038
Indonesia				
Italy	Dolliner, G. (1794-1872) Kützing, F. T. (1807-1893) Milde, ? J. Müller, U. I.			
Macedonia	Salzmann, P. (1781-1851) Seelos, G. (1831-1911) Sieber, F. W. (1789-1844) Tommasini, M. G. S. (1794-1879) Frivaldszky von Frivald, E. (1799-1870) Sieber, F. W. (1789-1844) Liebmann, F. M. (1813-1856) ? Lessing, C. F. (1810-1862) Schaffner, W. (? -1882)			
Mauritius				
Mexico				
Morocco	Broussonet, P. M. A. (1761-1807)			
Mozambique	Peters, W. C. H. (1815-1883)			

New Zealand	Sinclair, A. (c.1796-1861)	With printed label "Brachyglottis repanda, Forst. Northern Island, New Zealand. Andrew Sinclair, Esq., M.D./ From William Gourlie, Glasgow." Also with the label "Dr. Steetz Hamburg, with W. Gourlie's kind regards," Fig. 8. "In Norvegia prope Dovre leg. misitque Dr. Boek in Kongsberg. "In Finmarkia prope Hamerfrest leg. misit que amicus cl. Vahl filius, 1842." "In Panama leg. deditque Seemann, 1852."	<i>Brachyglottis repanda</i> Forster & Forster f.	1540568
Norway	Boek Vahl, J.L.M. (1796-1854)		<i>Erigeron alpinus</i> L.	681762
Panama	Seemann, B. (1825-1871)		<i>Saussurea alpina</i> DC.	1540774
	"		<i>Melananthera microphylla</i> Steetz	*677432
Poland	Buek, J.N. (1765-1856)	"Wedelia carnosa Rich. var. 1852, leg. deditque Seemann in Panama."	<i>Wedelia carnosa</i> Rich.	1542033
Romania	Bachofen	"in Silesia prope Vratislaviam lectos misit amicus cl. Buek in Francofurto ad Viadrum, 1839," "In Banatu leg. cl. cl. Bachofen, emi ab amico cl. Rochel, 1841," "In Transylvania leg. cl. Baumgarten; emi ab amico cl. Rochel, 1841," "In Transylvania in subalpinus versus alpe in Retyczat, mense Augusti leg. cl. auctor ipse, emi ab amico cl. Rochel, 1841," "Sphaeranthi senegalensis de Cand. a cl. Lelièvre in Senegalia lectae, in herb. cel. Kunth jard. reg. Berolin!" "Exemplar monicum veresimile in Capite Bonae Spei lectum recepi e herbario beati Dr. Comien, sine nomine 1833" "In Africa australi, ad flumen Gariep leg. cl. Drège. Herb. Drège N. 2721, emi a cl. peregrinatore ipso: 1844," "In Capite Bonae Spei, leg. cl. Ecklon, ded. Sickmann, 1826." "flor. Capensis leg. Ecklon, ded. v. Winthem, 1830." "In Capitae Bonae Spei leg. cl. Ecklon; recepi e herbario amici Milde, 1835." "In Capite Bonae Spei leg. cl. Ecklon; ded. Dr. Ruete, s.n. Helichrysi heterophylli, 1837."	<i>Aster salignus</i> Willd. <i>Erigeron acris</i> L. <i>Erigeron alpinus</i> L. <i>Anthemis inaequalis</i> Heuffel <i>Sphaeranthus senegalensis</i> DC. <i>Helipterum speciosissimum</i> DC. <i>Epilobium gariiepina</i> (DC.) Steetz <i>Leyseria gnaphalioides</i> L.	1540803 681761 681763 *1551585 1542032 678467 *1542031 1539411
Senegal	Drège, J.F. (1794-1881) Ecklon, C.F. (1795-1868)		<i>Utricularia capensis</i> Spreng. <i>Helipterum fasciculatum</i> DC. (= <i>Helichrysum sesamoides</i> Willd.)	90258 678463
South Africa	"		<i>Helipterum fasciculatum</i> DC. (= <i>Helichrysum sesamoides</i> Willd.)	678463
	"		<i>Nestlera rigida</i> DC. (= <i>N. humilis</i> Less.)	1539416
	"		<i>Helipterum filiforme</i> DC.	678464
	Ecklon, C.F. (1795-1868) & Zeyher, C.L.P. (1799-1858)	"In Capitae Bonae Spei. (ad Clanwilliam, ad flumen Olifantsrivier, et prope Villam Brakfontein, mense februarii) leg. cl. Ecklon et Zeyher; emi ab amico Drège, 1845." "In Capite Bonae Spei, ad montem Swellendam Berg, in Voormansbosch legg. amici cl. Ecklon et Zeyher, ded. amicus Sonder 1852."	<i>Helipterum virgatum</i> DC.	1539410
	"		<i>Helipterum sesamoides</i> DC. (= <i>Helichrysum sesamoides</i> Willd.)	678466

	Pappe, C.W.L. (1803-1862)		"Ad pedem montis Leonis in Capite Bonae Spei leg. misitque amicus cl. Dr. Pappe, 1843."	<i>Leyssera gnaphalioides</i> L.	1539411
	Preiss, J.L. (1811-1883)		"In Capite Bonae Spei. (Worcester) leg. cl. Preiss, die XXIV Novembri, 1838; ded. amicus Prof. Lehmann, 1841."	<i>Helipterum variegatum</i> DC.	1539409
	Sieber, F.W. (1789-1844)		"In Capite Bonae Spei leg. cl. Sieber; emi ab amico Ecklon, s.n. 'Astelma modestum Rehb.' flor cap. exs. No. 12./ 1836." Colln includes 'Fl. mixta No. 43'.	<i>Helipterum gnaphalioides</i> DC.	678465
	"		"In Capite Bonae Spei leg. cl. Sieber emi ab amico Ecklon 1836." Original, printed label "FL. capensis No. 253."	<i>Felicia tenella</i> Nees (= <i>F. fragilis</i> Cass.)	681760
Spain	Willkomm, H.M. (1821-1895)		"In Hispania prope Sevilam et Gades, leg. cl. Willkomm misit amicus cl. Prof. Kunze, Lipsiensis, 1846." Original printed label with "437. Bellis annua L. Sevilla et Gades."	<i>Bellis annua</i> L.	681767
Sweden	Laestadius, L.L. (1800-1861)		"in Laponia Luleari in Alpe Njunnas leg. cl. Laestadius, misit cl. Wickström, recepi e herbario beati Dr. Comien, 1833." Original, printed label with "In Alpe Njunnas Laponniae Lulensis. Ann. 1821: L.L. Laestadius."	<i>Erigeron alpinus</i> L.	681762
	Nyman, C.F. (1820-1893)		"Nyman 1844." Label, in unknown hand, with "Hieracium cymosum Lin./ Holmiae." Also label with "Dr. Steetz Herb."	<i>Hieracium cymosum</i> L.	681783
Switzerland	Born Coquebert de Montbret, A.F.E. (1781-1801)		"flor. Helvet., ded. Born, 1827. . . ." "in Helvetia leg. cl. Coquebert de Montbret, recepi e herbario beati Dr. Comien, 1833."	<i>Hieracium aureum</i> Scop. <i>Anemone baldensis</i> L.	681786 1540823
	Kern, ? J. Lagger, F.J. (1799-1870)		"flor. Helvet. ded. Kern, 1829. . . ." "1850." Label, in Buek's hand, with "in Helvet. e manu Driis Lagger/ J.N. Buek."	<i>Hieracium aureum</i> Scop. <i>Hieracium bifidum</i> Koch	681785 681784
	Shuttleworth, R.J. (1810-1874)		"in Helvetia (in planitie) leg. cl. Shuttleworth recepi e herbario beati Dr. Comien, 1833."	<i>Erigeron acris</i> L.	681761
	Stein, J.C. (1776-1834)		"in Helvetia prope Frauenfeld leg. Stein, recepi e herbario Kohlmeieriano 1837."	<i>Erigeron acris</i> L.	681758
Trinidad	Wrbna, F.		"Flor. Insulae Trinitatis. leg. Sieber; emi ab amico Ecklon 1836." Fl. Trinitatis. No. 149, collected for Sieber by Wrbna, see text.	<i>Myrcia splendens</i> (Sw.) DC. var. <i>genuina</i> Berg.	*1540721
Turkey	Boissier, P.E. (1810-1885)		"In Asia minori, in montibus Smyrnae supra Bournabat leg. cl. Boissier, dedit amicus cl. Sonder, 1851."	<i>Anthemis pectinata</i> (Bory & Chaub.) Boiss. & Reuter	1551586
U.S.S.R.	Hohenacker, R.F. (1798-1874)		"In Caucaso, territorio Elisabethpol leg. cl. Hohenacker, misit Dr. Noodt e Tiflis sub falso 'Erigeron caucasicus Stev.' nomine, 1846."	<i>Erigeron caucasicus</i> Stev. (= <i>E. pulchellus</i> DC.)	681765
	Karelin, G.S. (1801-1872) & Kirilov, I.P. (1821-1842)		"Prof. Fischer 1851." Label in Turczaninow's hand indicates the collection is from Altai and was gathered by Karelin & Kirilov. Separate label with the No. "1140."	<i>Anemone</i> sp.	1540819
	Phoebeus, P. (1804-1880)		"In Siberia lectam misit amicissimus Dr. Phoebeus, 1836."	<i>Anemone altaica</i> Fisch. ex Ledeb.	1540817

Rieder, J.G. von					
Turczaninow, N.S. (1796-1864)				<i>Hieracium triste</i> Willd..	681774
Wright, C. (1811-1885)				<i>Aster tataricus</i> L.f.	1539421
				<i>Antennaria alpina</i> Gaertn.	1547425
U.S.A.				<i>Bellis</i> sp.	681768
Beyrich, H.C. (1796-1834)				<i>Pectis filipes</i> Harvey & A. Gray ex A. Gray	*1542902
Coulter, T. (1793-1843)				<i>Aster undulatus</i> L.	1540799
Durand, E.M. (1794-1873)				<i>Aster tenuifolius</i> L.	1539423
				<i>Aster tenuifolius</i> L.	1539422
Engelmann, G. (1809-1884)				<i>Pericome caudata</i> A. Gray	1547421
Henry, T.C. (? -1877)				<i>Aster miser</i> L.	1540812
Lüders, F.G.T. (1813-1904)				<i>Aster sericeus</i> Vent.	1540805
Mead, S.B. (1798-1880)				<i>Aster diversifolius</i> Michaux (= <i>A. undulatus</i> L.)	1540800
Short, C.W. (1794-1863)				<i>Aster</i> sp.	1540806
"				<i>Solidago shortii</i> Torr. & Gray	1552517
"				<i>Aster heterophyllus</i> Willd. (= <i>A. cordifolius</i> L.)	1540813
"				<i>Aster</i> sp.	1539424
"				<i>Aster</i> sp.	1539428
Siedenburb					
<p>"In Kamtschatka leg. cl. Rieder mecum benevole communicavit amicus cl. beatus Prof. Fischer, Petropolitanus, 1848."</p> <p>"In montosis siccis prope Ircutiam, in Siberia baicalensi leg. cl. Turczaninoff, misitque 1848." Original label indicates that the collection was gathered in 1828.</p> <p>"misit amicus cl. Asa Gray, 1858." Original, printed label with "Herbarium of the U.S. North Pacific Exploring Expedition . . . C. Wright Coll. Arakamtchetchene Island, Behring Straits."</p> <p>"In America boreali leg. cl. Beyrich, ded. amicus cl. Dr. Buek 1844, (sine nomine)."</p> <p>Not labelled in Steetz's hand but believed to be the specimen referred to in <i>Bonplandia</i> 2:169-170 (1854). Acquired from Asa Gray.</p> <p>"In America boreali prope Philadelphia leg. misitque amicus cl. Durand in Philadelphia, 1836."</p> <p>"In America boreali, (Pennsylvania) leg. misitque amicus cl. Durand, in Philadelphia, 1837."</p> <p>"In America boreali, prope St. Louis (Missouri) leg. cl. Dr. Engelmann, emi ab amico Lüders, 1848."</p> <p>"1854." Printed "Herb. A. Gray" label with, in Gray's hand, "Pericome caudata A. Gr./New Mexico/Dr. Henry."</p> <p>"In America boreali prope St. Louis (Missouri) leg. dedique amicus Lüders, 1844."</p> <p>"In America boreali, (Illinois) specimina haec. pulcherima leg. cl. Dr. Mead; misit amicus cl. Dr. Short in Louisville, 1850."</p> <p>"In America boreali prope Lexington leg. misitque amicus cl. Dr. Short in Lexington (Kentucky) 1838." Original label indicates that the collection was gathered in 1837.</p> <p>"In sterilibus Indianae Americae borealis leg. misitque cl. Dr. Short sub plane dubio Asteris paniculati? nomine, 1841." Original label indicates that the collection was gathered in 1840.</p> <p>"In Rocky Islands at the falls of the Ohio, (loco classico) in America boreali leg. misitque amicus cl. Dr. Short ipse, 1843." Original label indicates that the collection was gathered in 1842."</p> <p>"In America boreali, ad ripas fluminis Ohio, prope North-Bend leg. misitque amicus cl. Dr. Short, 1844." Fig. 6.</p> <p>"In America boreali, (Fernbank ad ripas fluminis Ohio prope North Bend, Kentucky) leg. misit amicus cl. Dr. Short in Louisville 1850."</p> <p>"Prope Rochetter (New York) in America boreali leg. misitque Siedenburb, ded. amicus cl. Sonder, 1834."</p>					

Thurber, G. (1821-1890) & Calder, A.L. Townsend, D. (1787-1858)		"In America boreali, (Rhode Island) legg. cl. Thurber et Calder, misit amicus cl. Dr. Short in Louisville, 1850."	<i>Aster spectabilis</i> Ait.	1540811
		"In America boreali prope West-Chester leg. cl. Townsend misit cl. Dr. Short s. ne. 'Solidago speciosae' cum (quae non est), 1838." Original label with printed "David Townsend, West Chester, Pa."	<i>Solidago arguta</i> Ait.	681770
		"N. 1627 hb. Moritz . . . Hanc nominavit cl. Klotzsch."	<i>Eugenia karsteniana</i> Klotzsch ex Berg var. <i>albicans</i> Berg	*1540544
	Venezuela	Label in unknown hand has "Caracas, E. Otto." Also label with "Dr. Steetz Herb."	<i>Pectis elongata</i> Kunth	1545430
	Yugoslavia	"In Dalmatia leg. cl. Sieber, emi ab amico Ecklon, 1836."	<i>Helichrysum angustifolium</i> DC.	1539413
	Europe — country unknown	Original label with "Hieracium auricula Froelich. e herb. Froelichii/ d. Sz. Bip." With "Dr. Steetz Herb." label.	<i>Hieracium auricula</i> L.	681773
		Original label, possibly in Schultz-Bip.'s hand, with "26/6 34 d. D. Schultes fil., com. Sz Bip."	<i>Hieracium bathini</i> Bess. (= <i>H.</i> <i>praecaltum</i> Vill. ex Gochnat)	681771
		Schultes, D. fil.		

Table 3. Examples of *Orchis* L. sensu lato collections in the Steetz Herbarium.

COUNTRY	ORIGINAL SOURCE	STEETZ LABEL	TAXON	MEL NUMBER
Austria	Sonder, O.W. (1812-1881)	"in Alpihus Salisburgensibus lectam ded. amicus Sonder, 1838"	<i>O. speciosa</i> Host (= <i>O. mascula</i> L.)	1542450
Czechoslovakia	Sieber, F.W. (1789-1844)	"in Bohemia legit Sieber; emi ab amico Ecklon 1836." & "teste cl. Reichenbach."	<i>O. palustris</i> Jacq.	1542422
France	Buchinger, J.D. (1803-1888)	"in Alsatia prope Mutzig leg. Buchinger, e herbario beati Dr. Comien; 1833."	<i>O. hircinia</i> Crantz	1542420
	Hofman-Bang	"in Gallia lectam misit amicus cl. Hofman-Bang. 1835." & "teste cl. Reichenbach."	<i>O. simia</i> Lam.	1542449
Germany	Benecke, ?F.	"in Saxonia prope Naumburg legit Benecke; e herbar. amici Kohlmeier; emi 1837."	<i>O. pallens</i> L.	1542448
	Buek, J.N. (1779-1856)	"in Silesia prope Francofurtum ad Viadrum legit mistique amicus Buek 1837." & "teste cl. Reichenbach."	<i>O. sambucina</i> L.	1542421
	Comien	"in Franconia lectam recepi e herbario beati Dr. Comien, 1833" & "teste cl. Reichenbach."	<i>O. sambucina</i> L.	1542421
	Greve	"prope Monasterium legit exemplaria haecce Greve; e herbario beati Dr. Comien; 1833." Label, perhaps in Comien's hand, has "E flora Münster, ded. Greve 1829."	<i>O. pyramidalis</i> L.	1542426
	Hornung, E.G. (1795-1862)	"in Thuringia a prope Aschersleben leg. Hornung; e herbario amici Kohlmeier; emi 1837."	<i>O. palustris</i> Jacq.	1542422
	Lucae, ?A.F.T. (1800-1848)	"in Saxonia prope Naumburg leg. Lucae Berolinensis; e herbario amici Kohlmeier, emi 1837."	<i>O. sambucina</i> L.	1542419
	Kohlmeier (?-1860s)	"in Bavaria prope Augsburg lectam recepi e herbario amici Kohlmeier; 1837."	<i>O. coriophora</i> L.	1542423
	Kroeber	"prope Heidelberg leg. deditque amicus Kroeber; 1828."	<i>O. pyramidalis</i> L.	1542426
	Minder	"prope Lübeck leg. deditque amicus beatus Minder, 1824."	<i>O. pyramidalis</i> L.	1542426
	Richier, ?H.E.F. (1808-1876)	"prope Bonn (ad Rhenum) legit deditque amicus Richier; 1828." & "Omnia revera! teste cl. Reichenbach."	<i>O. maculata</i> L.	1542431
	Schönheit, F.C.H. (1789-1870)	"in Thuringia a prope Rudolstadt leg. Schönheit, e herbario amici Kohlmeier; 1837."	<i>O. hircinia</i> Crantz	1542420
	Sonder, O.W. (1812-1881)	"prope Arnstadt, oppidulo haud procul ab Erfurt in Thuringia lectam ded. amicus Sonder 1838."	<i>O. pallens</i> L.	1542429
	Steetz, J. (1804-1862)	"in Saxonia prope Halam ipse legi 1825."	<i>O. palustris</i> Jacq.	1542432
	"	"in Franconia prope Wirceburgum (Gerbrunn) ipse legi 1827." & "revera teste cl. Reichenbach."	<i>O. mascula</i> L.	1542433
	Steven von, ?C. (1781-1863)	"In Tauria leg. cl. de Steven; habeo specimen s.w. Orch. angustifoliae M.B. e herbario cl. Panzer, nunc Academiae Wirceburgensis pertinente, ab amicus cl. Prof. Leiblein, 1840." & "teste cl. Reichenbach, planta rara."	<i>O. iberica</i> Bieb. ex Willd.	1542435
	Uelm	"in Saxonia prope halam leg. deditque amicus Uelm; 1825." Fig. 5.	<i>O. morio</i> L.	1542427

Greece	Sieber, F.W. (1789-1844)	"in insula Creta (sine nomine) leg. Sieber; emi ab amico Ecklon; 1836."	<i>O. pyramidalis</i> L.	1542436
	Spruner, W. von (1805-1874)	"In Graecia (Hymethus) leg. cl. a Spruner, merumque benevole communicavit 1846." & "Revera! teste cl. Reichenbach."	<i>O. brancifortii</i> Biv. (= <i>O. quadripunctata</i> Ten.)	1542437
Italy	Hübener, ? J.W.P. (1807-1847)	"in Italia lectam ded. Dr. Hübener 1835."	<i>O. robertiana</i> Loisel. (= <i>O. longibracteata</i> Biv.)	1542439
	Milde, ? J.	"in italia (Cap Casarelle) legit amicus Milde, emi 1835."	<i>O. sinia</i> Lam.	1542449
	Müller, U.I.	"in Sardinia leg. Müller; emi a Dr. Hübener, 1835."	<i>O. saccata</i> Reichb.f. (= <i>O. sambucina</i> L.)	1542440
	Sieber, F.W.	"in Corsica, leg. Sieber; emi ab amico Ecklon; 1836." Printed label has "Pietro-Pugno ben Bastia-Corsica."	<i>O. pyramidalis</i> L.	1542436
	Tommasini, M.G.S. (1794-1879)	"In Istria prope Tergestum leg. cl. Tommasini (in pratis) ded. amicissimus Sonder, 1841" & "... teste Reichenbach."	<i>O. variegata</i> All.	1542454
Macedonia	Frivaldszky von Frivald, E. (1799-1870)	"In Macedonia leg. cl. Frivaldszky, misit amicus Rochel (Perthinensis), s.w. Orch. hircinae Linn., 1841." & "teste Reichenb."	<i>O. hircinia</i> Crantz	1542441
Norway	Boeck, C.P.B. (1789-1877)	"In Norwegia prope Kongsberg leg. dedique amicus cl. Dr. Boeck, 1841" & "Omnia revera! teste cl. Reichenbach."	<i>O. maculata</i> L.	1542430
	Hübener, J.W.P. (1807-1847)	"leg. Dr. Hübener; in Norwegia, ded. amicus Milde 1835."	<i>O. variegata</i> All.	1542454
Portugal	Lang	"In Luisitania prope Olisiporeum leg. amicus Dr. Lang; misitque (sine nomine) 1839." & "teste cl. Reichenbach."	<i>O. sinia</i> Lam.	1542443
Romania	Wierzbicki, P. (1794-1847)	"In sylvis prope Mehadia in Banatu leg. cl. Wierzbicki; misit amicissimus cl. Rochel (Perthinensis) 1841."	<i>O. tetragona</i> Hueffel (= <i>O. maculata</i> L.)	1542434
Switzerland	Hornung, E.G. (1776-1834)	"in Helvetia prope Genf leg. Hornung e herbar. amici Kohlmeier; emi 1837." & "teste cl. Reichenbach."	<i>O. militaris</i> L.	1542444
	Milde, ? J.	"In Helvetia in monte Simplon legit amicus Milde; emi 1835."	<i>O. variegata</i> All.	1542454
	Sickmann, J.R. (1779-1849)	"in helvetia lectam emi a Sickmann 1825" & "teste cl. Reichenbach."	<i>O. sambucina</i> L.	1542419
	Stein, ? J.C. (1776-1834)	"in Helvetia (in monte Rigi) leg. Stein, e herbario amici Kohlmeier; emi 1837." & "Has cl. Reichenbach non vidit."	<i>O. globosa</i> L.	1542447
	Durand, E.M. (1794-1873)	"In America boreali lectam misit Durand in Philadelphia 1836" & "teste cl. Reichenbach."	<i>O. spectabilis</i> L.	1542452
U.S.A.	Short, C.W. (1794-1863)	"in America boreali leg. misitque amicus cl. Dr. Short, Lexington; 1838."	<i>Habemaria spectabilis</i> Spreng. (= <i>O. spectabilis</i> L.)	1542451
	Schütze, G.	"In America boreali prope New-Washington leg. Schütze emi a Pharmacopola Pohlmann, Lubecensi 1837." & "teste cl. Reichenbach."	<i>O. spectabilis</i> L.	1542452

In finalising this paper we have examined perhaps one thousand collections belonging to Steetz's herbarium. They include algal, fern and flowering plant collections, with the latter group being by far the major component of Steetz's herbarium. We have failed to locate collections of fungi, lichens and bryophytes from his herbarium but a card index compiled some years ago does suggest the presence of bryophyte collections.

The reference by Stafleu & Cowan (1985) that Steetz's orchid collection is in W (as part of herb. Reichenbach) is clearly misleading, as evidenced by the 51 collections of *Orchis* L. (many of which are listed in table 3) and the 33 collections of *Ophrys* L. (ten species represented) which have been located in MEL.

All contributors, both direct and indirect, to Steetz's herbarium are indexed at the back of this paper. Direct contributors are listed in one or more of the four tables which outline examples of collections in the Herbarium. Species names in the tables are those used by Steetz, hence the broad concept of the genus *Orchis* L. In some cases we also give what we believe to be the currently accepted name, under which specimens are placed in MEL.

Additional information on contributors is usually not included due to the general availability of works such as Lanjouw & Stafleu (1954, 1957), Barnhardt (1965), Stafleu (1967), Stafleu & Cowan (1976, 1979, 1981, 1983, 1985), Chaudhri, Vegter & Da Wal (1972) and Vegter (1976, 1983, 1986). Stafleu & Cowan (1981), for example, refer to the series of papers by J. H. Maiden which detail many Australian botanists. However, additional information is provided when a collector is not well known or where new information is available as a result of our work. Similarly notes on several works to which Steetz contributed, i.e. Lehmann's *Pl. Preiss.*, Peters' *Naturw. Reise Mossambique* and Seemann's *Bot. voy. Herald*, are also included. All notes are arranged alphabetically by collector or author.

The size and condition of specimens in all herbaria is determined by many variables, including a botanist's desire to obtain representative specimens of species previously not in his keeping. This may be nothing more than a collector's whim to possess a collection of many species but was not the case for Steetz. In a letter to N. J. Andersson, dated 30 July 1854, he said of his request of specimens that "I do not look on my herbarium as a mere hobby, rather it is for me a tool in my scientific work. For this reason I do not need splendid specimens, but only some instructive and characteristic branches with complete capitula and a few leaves, which are adequate for my purposes as they provide sufficient information for my determinations" (translated from German). This statement supplies us with a reason why some species in Steetz's herbarium are represented by fragmentary specimens. A further comment in the same letter to Andersson also sheds light on this question. He states that "You will find that I returned all your specimens to you, even those represented by several specimens. I have even enclosed the analytical dissections of the capitula; only of the new genus . . . I have retained the analytical dissections of one capitulum which I used for my description. I always do it this way, because the trust of my friends and correspondents means more to me than the enrichment of my herbarium" (translated from German).

This method of operation probably explains why the few type collections in MEL of species described by Steetz in Peters' *Naturw. Reise Mossambique* primarily consist of dissected capitula (Fig. 7). Fragments of type specimens of species described by other botanists also exist in Steetz's herbarium, e.g. species of *Comesperma* Labill. Such collections have always been meticulously labelled by Steetz.

Although some fragmentary collections exist the majority are of good material and are frequently well labelled.

We have placed printed labels with the words "Herbarium J. Steetz (1804-1862)" with all collections examined and considered to belong to Steetz's herbarium. Many of the collections remain unmounted.

B. FLOWERING PLANTS (tables 1 to 3)

On arrival at MEL Steetz's herbarium contained both mounted and unmounted collections and at least some were contained in distinctive blue, generic folders with

the name written clearly on the outside (Fig. 3a). The majority of collections remain in much the same condition as when they arrived, except in cases where notes by MEL herbarium staff (especially by the botanical assistant J. R. Tovey) indicating that the collections are from Steetz's herbarium, have been added during their incorporation into the general collection. Thus notes, almost invariably on blue paper, such as "East India. Dr. Steetz Herb." and "Dr. Steetz Herb." (Fig. 3) can be found accompanying many collections. However the majority of collections lack such labels and positive identification can sometimes be difficult. On the other hand Steetz's handwriting (Figs 1, 2, etc.), the information he provided on labels and the format he used for mounted collections frequently allow for quick identification. Typical examples of mounted sheets from Steetz's herbarium, which may contain one or more separate collections, are shown in Figs 4,5,6. Specimens are invariably mounted with paper strips and the name of the taxon, in comparatively large letters, is written near the base of the sheet. Locality details and notes on the

and richest of the world. But I think,
if even only one specimen should be
worthy of being accepted into your Herba-
rium, it would lie there on the right
place.

Therefore, my dear Sir, I beg you
to excuse my boldness and to let me
hope, that you will kindly accept
this little parcel.

I have the honour, with the
highest esteem to be

my dear Sir

Yours very truly
Joachim Steetz Dr

Fig. 1. Part of letter from Steetz to Bentham, dated 21 August 1856. (K, North Europe letters, NAE.-YOU. 1845-1900). Actual size.

Gefaserte sind auch Gefaserte,

Meine vorliegende und sollte ich Ihnen ab,
sind die mit größter Zugsamkeit Brief des Herrn
Mauritz Fischer, u. sind die nicht inwendig in der
den letzten Abhandlung über das Gewicht,
welche für mich eine so große Macht haben, als
das zu fallend anstelle, daß ich zu dem die Mineral,
durch diese Lerneung Ihre so unvermeidliche War.
dieser die Mineralogie war nicht sind, in dem
Licht der die Mineralogie fand. — Ich habe da-
mals die Bedeutung nicht gefunden, das zu
so vielen Erwartungen, aber mich zu so vielen
unvollständigen Erwartungen wurde Aufsatz
gab, u. sollte mich glücklich, durch Ihre Güte in
den Besitz des selben zu kommen zu sein.

Was die unvollständige Alge, die (Herrn)
verändert, welche mich mit dem Herrn
Ihre großen Erwartungen in die Welt zu setzen
anleitet, so bediene ich, Ihnen was das Fund
kein Beispiel davon mitteilen zu können,
weil ich selbst keine davon besitze. — Ich habe
mich aber nun ^{meine} gefunden Sonder gemacht, u. war-
te die vorläufige Zeitschrift auf, daß ich Ihnen

Fig. 2. Part of letter, in German script, from Steetz to von Struve, dated 3 February 1849. (Staatsbibliothek, Preussischer Kulturbesitz). Actual size.

acquisition of a collection are in Latin and are found immediately below the specimen(s). (Original, but loose, collector's labels also frequently accompany specimens.) Synonyms, often with a full literature citation, are often noted on the lower corners of sheets and additional notes referring to species affinities, etc. may also be recorded.

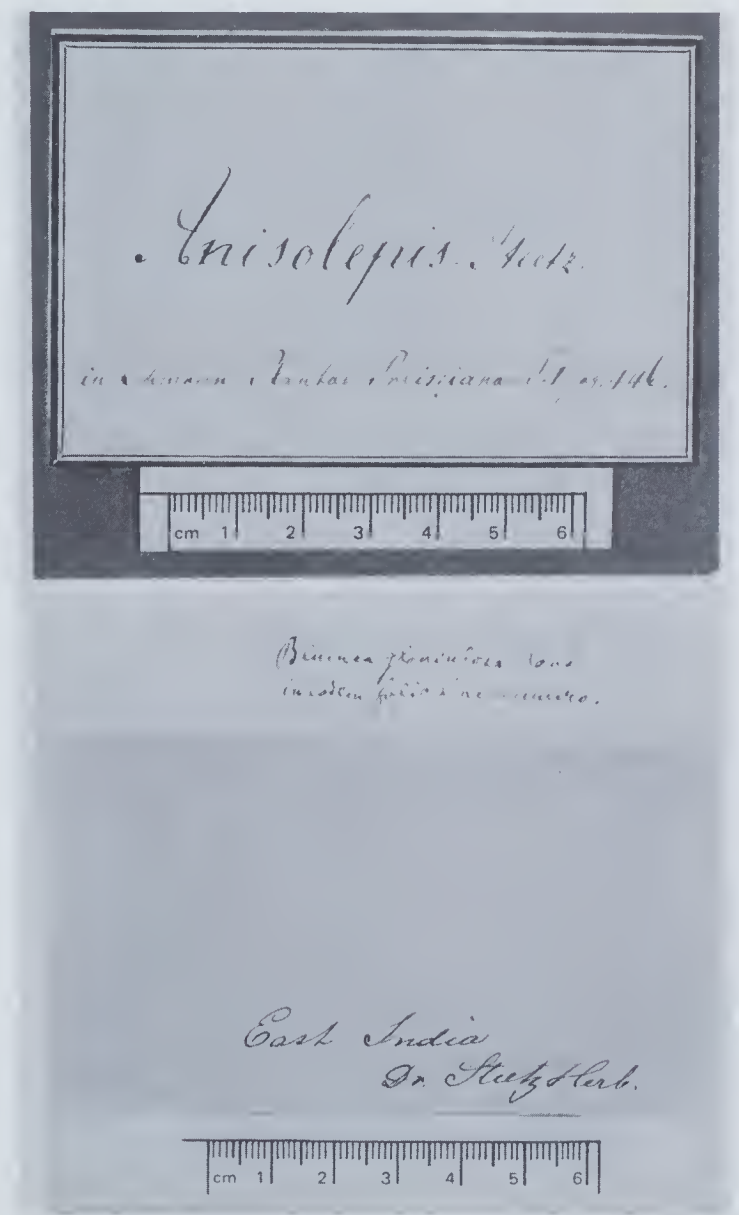


Fig. 3. Upper — Label from a generic folder from Herb. Steetz used for flowering plants. In Steetz's hand. Lower — Labels accompanying a specimen of *Blumea* DC. (MEL 611821); upper label in Steetz's hand, lower label in hand of botanical assistant at MEL.



Fig. 4. Lectotype sheet of *Pogonolepis stricta* Steetz, from Herb. Steetz (includes additional labels added since acquisition by MEL).



Fig. 5. Sheet with specimens of *Orchis morio* L., from Herb. Steetz (includes additional labels added since acquisition by MEL).

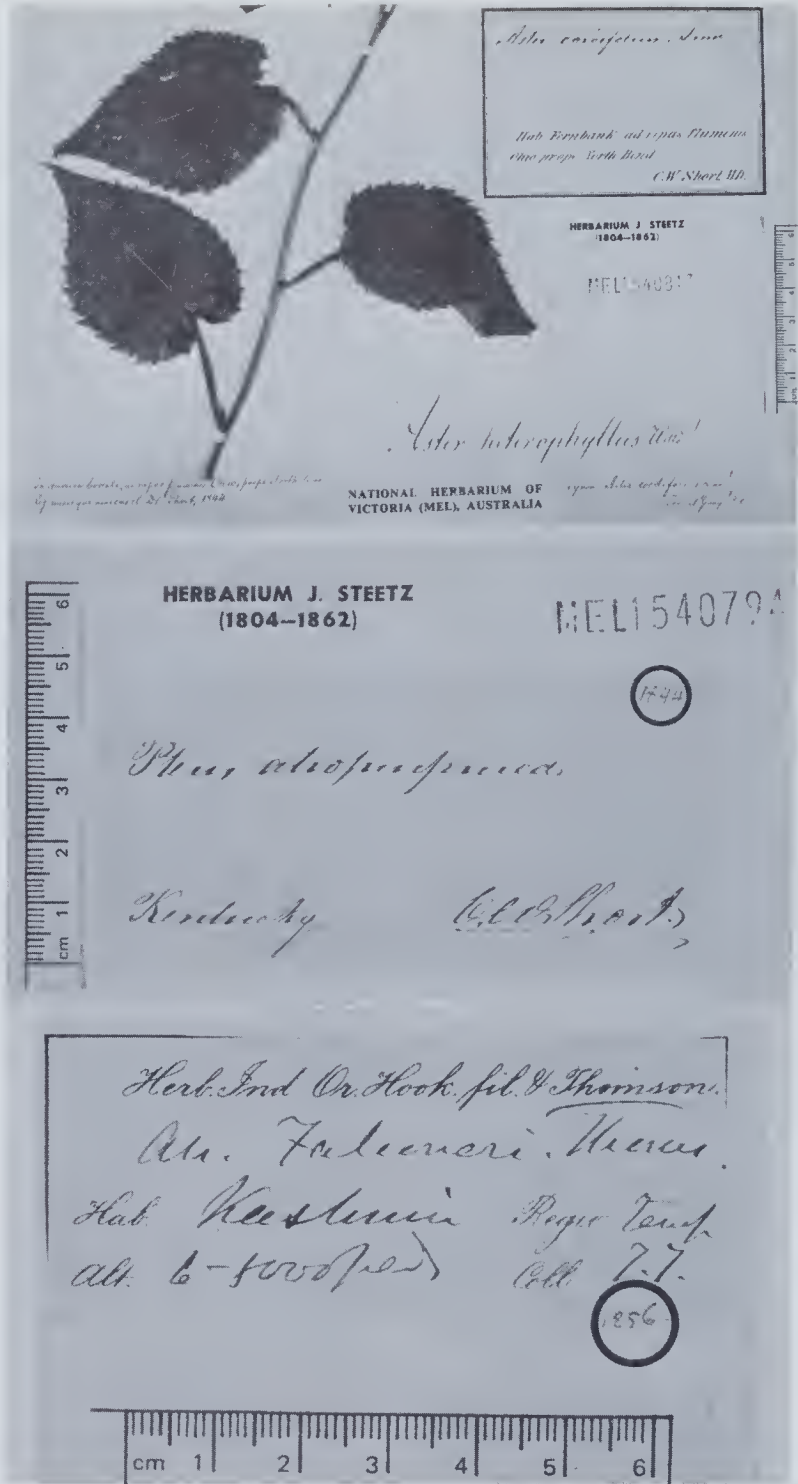


Fig. 6. Upper — Collection of *Aster heterophyllus* Willd. obtained by Steetz from C. W. Short in 1844. Middle — Label, in C. W. Short's hand, with the date "1844", the date of receipt, recorded in Steetz's hand. Lower — Label accompanying collection of *Anemone falconeri* Thoms. (MEL 1540821). The date "1856" believed to be in Steetz's hand.

The majority of Steetz's herbarium consists of unmounted specimens and their identification is usually reliant on the identification of handwriting although the information noted on the label is also a useful guide. Thus the label accompanying the specimens of *Utricularia intermedia* Hayne (MEL 90303) gives reference to the place of publication, etc., in the same manner which was noted for Steetz's mounted specimens. (In this example the label appears to be part of a species folder which contained more than one collection. The folder was apparently cut into pieces during the mounting of the specimen for loan in 1979.)

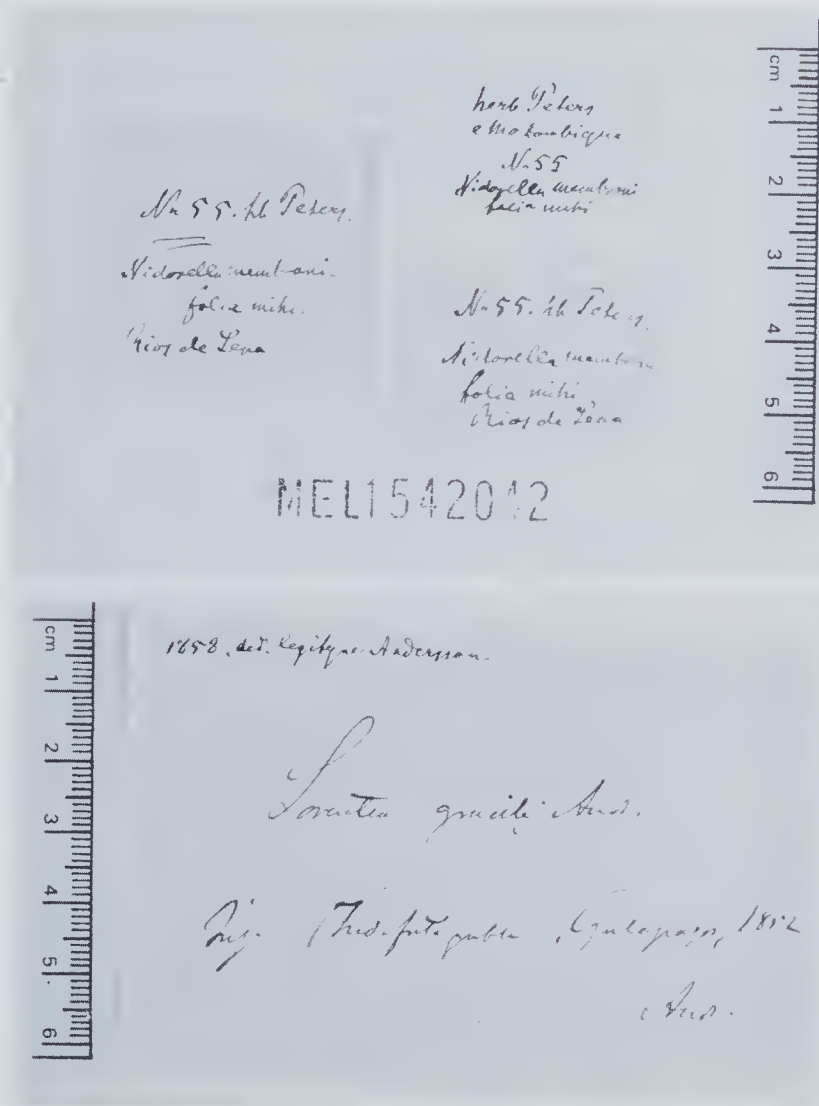


Fig. 7. Upper — Envelopes, annotated by Steetz, containing fragments of *Nidorella membranifolia* Steetz (MEL 1542042). Lower — Label, primarily in the hand of N. J. Andersson, with annotation by Steetz in the upper left hand corner, accompanying specimens of *Lorentea gracilis* Hook. f. [= *Pectis subsquarrosa* (Hook. f.) Schultz-Bip.] (MEL 1543494).

Steetz often acquired fragments of type collections of species. Such fragments, in some cases the only material of a particular taxon in his herbarium, are to be found in small envelopes with annotations in Steetz's hand on the outside of the packets, e.g. *Nidorella membranifolia* Steetz (Fig. 7).

In many cases the referral of a specimen to Steetz's herbarium can be difficult due to a paucity of Steetz's writing on the label. For example, a specimen from Chile of *Senecio bahioides* Hook. & Arn. has only "Philippi 1858" in Steetz's hand on a label which has, in an unknown hand, the locality details for the specimen. Similar situations abound throughout the herbarium and clearly much care must be taken when deciding whether to attribute such specimens to Steetz's herbarium. It is more difficult to decide whether collections with only a pencilled date (year only) in the corner of a label which is otherwise clearly not in Steetz's hand can be attributed to his herbarium. However there is good evidence to suggest that many MEL collections labelled in this fashion are part of Steetz's herbarium. There are collections, e.g. of *Hieracium sudeticum* Tausch (MEL 681775, table 2), in which labels with only the date apparently in Steetz's hand are also accompanied by "Dr. Steetz Herb." labels (referred to above) added during the incorporation of the collections in MEL. Further evidence, which indicates that the pencilled dates reflect when Steetz acquired collections, comes from examining data obtained on the acquisition of collections from C. W. Short and E. M. Durand (see notes on Fern Herbarium).

There are collections made by Andrew Sinclair from New Zealand which lack notes in Steetz's hand but can be attributed with some confidence to his herbarium. A letter in the K archives indicates that Steetz received Sinclair collections via William Gourlie of Glasgow (see below under notes on Sinclair). In MEL we have found specimens accompanied by printed labels indicating that they are Sinclair collections from Gourlie. One collection, of *Brachyglottis repanda* Forst., is also accompanied by a handwritten label with the words "Dr. Steetz, Hamburg, with W. Gourlie's kind regards" (table 2, Fig. 8). However, all collections at MEL with the printed Sinclair/Gourlie label cannot be automatically regarded as being part of the Steetz herbarium. The possibility that some collections may have been obtained via other channels cannot be discounted, particularly in view of the fact that Mueller acquired collections from many sources during his term as Government Botanist.

C. FERNS (table 4)

Steetz's Fern collection apparently arrived at MEL in an unmounted state. Many specimens can be referred readily to his herbarium because of the handwritten labels. As with the flowering plant collection we also have New Zealand collections with printed Sinclair/Gourlie labels, e.g. collections of *Hymenophyllum* Smith and *Asplenium* L., which probably come from Steetz's herbarium. Similarly, there are collections with only a pencilled date (Fig. 6), or date and collector's name, which may be in Steetz's hand but on labels which are otherwise clearly not written by him. Evidence that they are part of Steetz's herbarium comes from an examination of C. W. Short's and E. M. Durand's collections from the United States of America. It is clear from original mounted collections of flowering plants with data pertaining to their acquisition in Steetz's hand, that Short sent material to him on no fewer than six separate occasions, i.e. in 1837, 1838, 1841, 1843, 1844 & 1850 (see table 2). We have in the Fern herbarium collections gathered by Short, e.g. of *Pellaea atropurpurea* (L.) Link (Fig. 6b, table 4) with either printed labels or labels in Short's hand, plus a pencilled date (year only) in the corner of the labels. The dates invariably match those noted by Steetz for the receipt of flowering specimens acquired from Short. A similar situation exists for some collections made by Durand who forwarded specimens of flowering plants to Steetz in 1836 and 1837 (see table 2). For example there is a collection of *Pellaea atropurpurea* (table 4) at MEL with "Durand 1837" pencilled in the corner of a label which is otherwise not in Steetz's hand. Because of these examples we have tentatively referred other collections

Table 4. Examples of fern collections in the Steetz Herbarium.

COUNTRY	ORIGINAL SOURCE	STEETZ LABEL	TAXON	MEI NUMBER
Canary Islands	Bolle, C.A. (1821-1909)	Label, in Bolle's hand, with "Gymnogramme leptophylla Desv./ Teneriffa. 1852/ Carl Bolle". Pencilled date "1854" suggests Steetz herbarium, see text.	<i>Anogramma leptophylla</i> (L.) Link	1540793
Germany	Unknown	"flor. Hamburg, 1824/ flor. Halens. ded. Schlüter 1826." [Suggests mixed colln.] Fig. 8.	<i>Athyrium filix-femina</i> (L.). Roth.	1540787
New Zealand	Sinclair, A. (c. 1796-1861)	Printed label with "Northern Island, New Zealand. Andrew Sinclair, Esq., M.D./ From William Gourlie, Glasgow." See text.	<i>Hymenophyllum demissum</i> (Forster) Swartz	106408
Portugal	Lang	"Trichomanes canariensis L., Brot. Lus. T. 2 pag. 395, Lissabon. Dr. Lang. 1839."	<i>Anogramma leptophylla</i> (L.) Link	1540788
U.S.A.	Durand, E.M. (1794-1873)	Label in unknown hand has "Pteris atropurpurea L. Nova Caesarea" plus, probably in Steetz's hand, "Durand 1837". See text.	<i>Pellaea atropurpurea</i> (L.) Link	1540792
	Schütze, G.	"eml a Pohlmann, pharmacopola Lubecensi 1837." On the same label but in an unknown hand "Pteris atropurpurea L. Felsenklippen des Missouri Ufers New-Washington. Schütze."	<i>Pellaea atropurpurea</i> (L.) Link	1540789
	Short, C.W. (1794-1863)	Stamped label with "C.W. Short, M.D. Lexington, Kentucky. 1837." Same label with pencilled date "1838", probably in Steetz's hand. See text.	<i>Pellaea atropurpurea</i> (L.) Link	1540791
	"	Label in Short's hand "Pteris atropurpurea, Kentucky, C.W. Short". Same label with pencilled date "1844". See text. Fig. 6.	<i>Pellaea atropurpurea</i> (L.) Link	1540794
Venezuela	Moritz, J.W.K. (1797-1866)	"No. 266. Sphaerocionium hirsutum Presl., Hymenophyllum -- Lin. Tovar Thorey, 1849." [Also with original Moritz label.]	<i>Hymenophyllum hirsutum</i> (L.) Swartz	657862
Cultivated	Unknown	"41) Pteris atropurpurea/ Spreng syst. veg. T.4 pag. 72./hort. bot. Bonnens. ded. Richter 1828."	<i>Pellaea atropurpurea</i> (L.) Link	1540790

Table 5. Examples of algal collections in the Steetz Herbarium.

COUNTRY	ORIGINAL SOURCE	STEETZ LABEL	TAXON	MEL NUMBER
EUROPE Adriatic Sea	Hübener, J.W.P. (1807-1847)	"e mari adriatico ded. Dr. Hübener 1835"	<i>Sphacelaria scoparia</i> [= <i>Stypocaulon scoparium</i> (L.) Kuetz.]	500966
	Lenormand, S.R. (ex hb.) (1796-1871)	labelled by Lenormand "Mer Adriatique", annotated on back of sheet "Dr. Stz.H."	<i>Sphacelaria cirrosa</i> (Roth) C.Ag.	501148
	Suhr, J.N. von (1792-1847)	"e mari baltico, misit cl. Suhr ad amicum Senat. Binder, qui mecum communicavit 1834"; labelled by Suhr "mare baltico"	<i>Sphacelaria cirrosa</i> (Roth) C.Ag.	501063
	Hofman-Bang, N. (1776-1855)	"ad litus Hofmansgave (Fioniae) misit amicus cl. Hofman-Bang 1835"; labelled by Hofman-Bang "Sphacelaria pennata Lyngb., ad litus Hofmansgave"	<i>Sphacelaria plumula</i> var. <i>gracilis</i> [= <i>Sphacelaria cirrosa</i> (Roth) C.Ag.]	500836
England	Binder, N. (ex hb.) (1785-1865)	"ad oras anglicas (prope Dover), ded. amicus Senat. Binder 1834"	<i>Sphacelaria cirrosa</i> (Roth) C.Ag.	501078
	Crouan frat. (P.L. & H.M.) (1798-1871) & (1802-1871)	labelled by one of the Crouan brothers "Mesogloia virescens Berk.! rade d.Brest", annotated by Lenormand "Mr Crouan", and on the back of the sheet "Dr.Stz.H."	<i>Mesogloia virescens</i> [= <i>Eudesme virescens</i> (Carm. ex Harv.) J.Ag.]	665834
Germany	Lenormand, S.R. (1796-1871)	labelled by Lenormand "Cherbourg", annotated on back of sheet "Dr. Stz.H."	<i>Mesogloia vermicularis</i> [= <i>Mesogloia vermiculata</i> (Sm.) S.F. Gray]	665847
	Binder, N. (1785-1865)	"circa Helgoland leg. deditque amicus Senat. Binder 1834"	<i>Sporochneus aculeatus</i> [= <i>Desmaresia viridis</i> (O.F. Müll.) Lamour.]	677280
	Gaedecheus	"ad insulam Helgoland leg. deditque amicus Dr. Gaedecheus 1836"	<i>Cladostephus spongiosus</i> (Huds.) C.Ag.	500860
	Steetz, J. (1804-1862)	"Mesogloia virescens auct. Anglos, teste Dr. Liebmann, ad insulam Helgoland legi 1834"	<i>Mesogloia virescens</i> [= <i>Eudesme virescens</i> (Carm. ex Harv.) J.Ag.]	665831
Italy	Römer, F.A. (1809-1871)	"ad Tergestum in mari adriatico ded. Assessor Römer e Hildesheim 1834"	<i>Sphacelaria scoparia</i> [= <i>Stypocaulon scoparium</i> (L.) Kuetz.]	500965
Sweden	Suhr, J.N. von (1792-1847)	"ded. Suhr Slesvicens. 1841", labelled by Suhr "Herb.S., Skaflo, mare Bahusia 1840"	<i>Mesogloia vermicularis</i> [= <i>Mesogloia vermiculata</i> (Sm.) S.F. Gray]	665848
NON-EUROPE Canary Is.	Suhr, J.N. von (ex hb.) (1792-1847)	"ad insulas fortunatas, ded. amic. cl. Suhr Slesvicens. 1835"; labelled by Suhr "ex Ins. fortunatis"	<i>Chondria acanthophora</i> [= <i>Acanthophora spicifera</i> (Vahl) Boergesen]	677275

Cuba	Binder, N. (ex hb.) (1785-1865)	"ad insulam Havannah, ded. amicus Sen. Binder 1834"	<i>Sphaerococcus musciformis</i> [= <i>Hypnea musciformis</i> (Wulf.) Lamour.]	677277
West Indies	Binder, N. (ex hb.) (1785-1865)	"ad insulam St. Croix, ded. Sen. Binder 1834", labelled in an unknown hand "Westindien" and by Binder "St. Croix"	<i>Chondria acanthophora</i> [= <i>Acanthophora spicifera</i> (Vahl) Boergesen]	677274
	Thorey, D.	"e India occident. ded. amicus Dr. Fallati 1834"; with "D. Thorey, Westindien" in an unknown hand.	<i>Sphaerococcus musciformis</i> [= <i>Hypnea musciformis</i> (Wulf.) Lamour.]	677278
Chile	Frölich, F.H.W. (ex hb.) (1769-1845)	"ad Indiam occidentalem, ded. amicus Dr. Buek 1836"; labelled in an unknown hand "Ind.occidental. (Fröhlich)"	<i>Chondria acanthophora</i> [= <i>Acanthophora spicifera</i> (Vahl) Boergesen]	677276
	Ravn, P. (1783-1839)	"ad insulam St. Thomas leg. Ravn, ded. Dr. Schön 1847"	<i>Acanthophora spicifera</i> (Vahl) Boergesen	674889
	Lenormand, S.R. (ex hb.) (1796-1871)	labelled by Lenormand "Detroit d. Magellan", annotated on the back of the sheet "Dr. Stz.H."	<i>Sphacelaria funicularis</i> [= <i>Cladostephus spongiosus</i> (Huds.) C.Ag.]	500961

exhibiting only pencilled dates of acquisition to Steetz's herbarium, e.g. Bolle's collection of *Anogramma leptophylla* (L.) Link (table 4). However we have generally refrained from this practice.

D. ALGAE (table 5)

Although not nearly as extensive as his herbarium of higher plants, Steetz nonetheless owned a considerable algal herbarium. In his original herbarium, specimen sheets were kept in species folders (33.5 x 21 cm) which were annotated on the lower, right-hand side with binomial and author citation, synonyms, often literary references and locality and source of the collection with the year of acquisition. The folder contained one to several specimen sheets, usually with their own brief annotations or labels in the hand of a previous owner of the specimen. Few of these folders, with their contents intact, still exist. Most were cut up on incorporation into the MEL collections, with only the annotated portion being retained as a label. As a result many collections, previously in one folder, were separated and information sometimes lost.

The algal herbarium contains many specimens collected by Steetz himself, mostly from Helgoland. There are also a considerable number of specimen sheets from Lenormand which are not labelled by Steetz but are marked "Dr. Stz. Hb.", presumably by a former MEL staff member assisting with the incorporation of specimens.

NOTES ON CONTRIBUTORS AND PUBLICATIONS

ANDERSSON, NILS JOHAN (1821-1880).

Andersson spent ten days (11-20 July 1852) collecting in the Galápagos Islands, returning to Sweden with 325 numbers (Wiggins & Porter 1971). Andersson (1854) subsequently published an account of the vegetation of the Galápagos Islands (see Stafleu & Cowan 1976). At MEL we have collections gathered from this expedition. About 25 species, from the Compositae, Euphorbiaceae, Leguminosae, Losaceae, Malvaceae, Rubiaceae and Verbenaceae have been located. Some give no indication as to how they were acquired but others came as part of either O. W. Sonder's or Steetz's herbarium.

At least nine species of Compositae collected by Andersson from the Galápagos Islands and now in MEL can be attributed to Steetz's herbarium. It is evident from Steetz's letters to Andersson (see Appendix 1) and the date of receipt recorded by Steetz on herbarium labels (table 2, Fig. 7) that he acquired specimens on at least three separate occasions. Thus in July 1854 he wrote to Andersson saying he was returning his plants to him. Apparently Andersson had sent Steetz his collection of Compositae from the Galápagos Islands for determination. Specimens of *Trigonopterum ponteni* Andersson ex Steetz were included in this collection and used by Steetz to compile his description. Steetz noted in this letter that, with the exception of a single dissected capitulum of *T. ponteni*, he was returning all material to Andersson. However in the same letter he requested that Andersson reserve for him as complete a set as possible of Compositae. Specimens were duly forwarded and their receipt acknowledged by Steetz in a letter dated 24 February 1856. Their date of receipt, i.e. 1856, is also recorded by Steetz on herbarium labels. In the same letter Steetz also accepted Andersson's offer of further plants from the Galápagos Islands and we know from herbarium labels that he received specimens in 1858. In a letter dated 28 June 1859 Steetz commented on several species of Compositae and thanked Andersson for his valuable specimens from the Galápagos Islands. Steetz was very apologetic about his delay, clearly of some months, in replying to Andersson and it seems likely that he was acknowledging receipt of the specimens received the previous year.

Although not located at MEL it is evident from Steetz's letter dated 30 July 1854 that Andersson planned to send him some Swedish plants in exchange for some collections of Compositae held by Steetz.

BINDER, NIKOLAUS (1785-1865).

The major part of Steetz's algal herbarium consists of specimens obtained from Binder. Binder, the son of an advocate, was born in Lübeck on 11 May 1785. He followed a legal career, studying in Tübingen, Göttingen and Heidelberg. In 1811, after the dissolution of the Lübeck Senate under the French rule, he went to live in Hamburg where he was registered as Advocate at the Imperial Court. He remained in the city after the restoration of Hamburg's independence and obtained citizenship in 1815. He continued to practise as an advocate until his election to the Hamburg Senate in 1823. In 1855 he was elected Lord Mayor of Hamburg. He retired in 1861 and died on 23 November 1865 (in litt., Dr I. Friederichsen, HBG, 1978).

Binder had a keen interest in botany, especially phycology. Relatives, friends and many ships' captains collected algal specimens for him (in litt., Dr I. Friederichsen, 1978) and he also purchased J.G.C. Lehmann's algal herbarium. Many new species were described by various phycologists from specimens obtained from Binder. The botanists J. Agardh, W.H. Harvey, F.T. Kützing, C.J.F. Schmitz and O.W. Sonder named genera and species of algae after him.

Binder's herbarium was presented to the Botanical Institute in Hamburg (HBG) after his death (Fischer-Benzon 1890).

HOOKE, JOSEPH DALTON (1817-1911) and THOMSON, THOMAS (1817-1878).

Mueller (1862, 1863d), in annual reports to the Government of Victoria, noted that MEL acquired collections made by Hooker and Thomson in India. A letter (19 March 1856, K) from Steetz to Hooker, sent from Hamburg, also reveals that Steetz received collections from India:

"Some days ago I had the pleasure of receiving a great parcel with Indian plants under my address through Mr. Pamplin in London. No letter accompanied this very valuable collection, but in the inside of the parcel a few lines informed me, that I am indebted for it to yours and Dr. Thomson's munificence.

Therefore, my dear Sir, I hasten to return to you and Dr. Thomson my best thanks for this most interesting present, containing many species even genera of plants, which I never saw before, and whose scientific worth I fully know to estimate, being the original materials to the most important work, the excellent *Flora Indica* of your pen, just now coming out." [(C) RBG Kew]

Examination of the MEL collections of non-Australian species of *Blumea* DC. confirms the presence of Hooker and Thomson collections from India. Thus eight sheets contain printed labels with the words 'Herb. Ind. Or. Hook. fil. & Thomson' and others have handwritten labels (unknown hand) which record Thomson as the collector. No information as to their source, i.e. K, Steetz, or perhaps O.W. Sonder, is recorded. However there are some Indian collections of *Blumea* which are clearly from Steetz's herbarium (c. 21 sheets) but they give no indication as to the collector(s). They all bear a label "East India. Dr. Steetz Herb." in an unknown hand plus notes which are in Steetz's hand (Fig. 3). It seems likely that the specimens are those received from Hooker. Information from a collection of *Anemone falconeri* Thomson which has a printed label and a pencilled date "1856" (Fig. 6, table 2) also suggests that some of the Hooker and Thomson collections of *Blumea* with printed labels may have come to MEL as part of the Steetz herbarium.

MORITZ, JOHANN WILHELM KARL (1797-1866).

A letter from Steetz to George Bentham, sent from Hamburg on 21 August 1856 (K), reads in part:

"A few weeks ago, I addressed a little parcel of Ferns, collected by Moritz in Venezuela, to Mr. William Gurlie in Glasgow, not aware of the most lamented death of this zealous, able and honourable young Botanist.

His brother, Mr. James Gurlie giving me this painful notice, offered me at the same time, to direct it to Dr. Joseph Hooker, to whom I am indebted for a large and splendid collection of Indian plants.

Now I am told by my friend, Dr. Berthold Seemann, that Dr. Hooker's Herbarium is combined with yours, and so I should be very glad, if you would favour me in considering this little parcel, which probably already arrived in Kew, as directed to yourself.

The tickets bear the name and number under which the specimens are distributed by Moritz and determined by Dr. Klotzsch of Berlin in the *Linnaea* but I had no time to re-examine them, and fear, that most of the high numbers after 387, named by Moritz as new species, may be old known species, because Mr. Moritz in his farm in Venezuela probably is in want of most of the necessary literary materials."[(C) RBG Kew]

As well as dispensing Moritz's fern collections to K, Steetz retained some collections in his own herbarium. Our survey of the non-Australian fern collection at MEL has revealed Moritz collections of *Ceropteris* Link, *Diplazium* Swartz, *Gymnogramma* Desvaux, *Hemionitis* L., *Hymenophyllum* Smith (see table 3) and *Pellaea* Link. As indicated in table 2, Steetz also obtained Moritz collections of flowering plants.

PETERS, WILHELM CARL HARTWIG (1815-1883).

Steetz contributed the treatment on Compositae for Peters's *Naturw. Reise Mossambique*, the complete work on the family being published in volume six, part two in March or April 1864 (Stafleu & Cowan 1983), approximately two years after Steetz's death.

In a letter (6 September 1853) to Asa Gray Steetz said that he had received, via the auspices of Dr Klotzsch, Peters's Compositae from Mozambique. Following letters to Gray provide some insight into Steetz's progress on the Compositae and the problems he encountered. Thus at one stage (8 July 1854) he forwarded fragments of an unknown composite from Mozambique for comment by Gray noting that "the flowerhead however is corroded by insects like all specimens having before me". In 1857 (20 April, 28 July) he wrote a particularly long discourse on taxonomic concepts in the Compositae, particularly the Vernoniaceae, as a result of his work with the Mozambique plants. He also noted (28 July) that he was "on the point of finishing my Vernoniaceae of Mozambique" but in another letter (11 November 1858) he said of his conspectus of the Vernoniaceae that "my manuscript is now under the press, but not finished, because my leisure time, remaining from medical practice is but a very short one" and "when the whole manuscript, containing detailed characters of the genera and species, will have left the press I shall haste to send it to you". He did however forward a brief, presumably hand written conspectus of the genera of the Vernoniaceae to Gray for comment and in a further letter (31 March 1859) he commented further on the conspectus, Gray having furnished a reply. In this letter he also stated that "No more than six sheets of my paper are printed now, and two others will finish the Vernoniaceae. I have asked our mutual friend Dr. Klotzsch at Berlin, under whose redaction the whole work appears, for one copy of my treating of Compositae, to send it to you as far as ready and that he send to you every sheet as soon as it appears". Finally in 1861 (19 October) Steetz informed Gray that his treatment of the Compositae was still incomplete but "the twenty first sheet just now is gone under the press".

In a letter to N. J. Andersson (28 June 1859) Steetz also noted the slow progress on the Compositae of Mozambique and said eight sheets had been printed.

The distribution of preprints by botanists was a common practice last century and the above extracts from letters to Andersson and Gray suggest that at least part of volume six, part two of Peters's *Naturw. Reise Mossambique* may have been issued as preprints. Stafleu & Cowan (1983) noted that sheets of volume six, part one were issued well before publication of the complete work, a fact which shows that the issue of preprints was an established practice for this work.

Stafleu & Cowan (l.c.) noted that Peters's herbarium at B is only partly extant, with some duplicates at A, BR, CGE, EA, K & LE. It is evident from publications by Wild (1967, 1969, 1975, 1978, 1980) Jeffrey (1968), Pope (1975) and Wild &

Pope (1977a,b) that type collections of species described by Steetz in Peters's *Naturw. Reise Mossambique* are not to be found in B, apparently having been destroyed. In at least one case this has led to the selection of a neotype, i.e. for *Nidorella microcephala* Steetz by Wild (1969). Few species examined by Steetz for this work are represented in his herbarium and those that are tend to be somewhat fragmentary (mainly dissected capitula). Type specimens of *Nidorella membranifolia* Steetz (Fig. 7) and *N. microcephala* have been located.

PREISS, JOHANN LUDWIG (1811-1883).

Preiss, a German naturalist, arrived in the Swan River settlement of Western Australia in December 1838 (Calaby 1967) and by the time of his departure in January 1842 he had amassed a substantial collection of plants and animals. Approximately 2,700 plant collections subsequently formed the basis of *Pl. Preiss.* (Lehmann 1844-48) which is primarily an enumeration of the plants collected by Preiss in the Swan River Colony. The work also includes descriptions of taxa described from specimens gathered by other collectors, e.g. James Drummond in Western Australia and John Lhotsky, Thomas Mitchell and G. Theodor Siemssen in Eastern Australia.

In his preface to *Pl. Preiss.* the editor, J. G. C. Lehmann (1844), made it clear that Preiss's collections were handed to him and sorted into families before being made available to the 19 co-authors, one of whom was Steetz, for the compilation of descriptions. A list of Preiss's specimens numbered in this fashion is included in *Pl. Preiss.* 2:371-429 (1848). There are also in existence specimens, for example collections of *Grevillea* from TCD which, although bearing labels in Preiss's hand, have different collection numbers than the comparable, presumed duplicate, specimens cited in *Pl. Preiss.* (McGillivray 1975). Such specimens were distributed prior to Preiss handing the bulk of his collection to Lehmann.

The National Herbarium of Victoria contains a considerable number of Preiss specimens. They were obtained through several channels. Mueller (1854), writing to Bentham, noted that he had received 400 Preiss numbers from O. W. Sonder, and further collections arrived when Sonder's private herbarium was acquired in 1883. A large number of specimens were received as part of the Steetz herbarium.

Just how the Preiss collections were handled subsequent to the systematic sorting by Lehmann is generally unclear (Crisp 1983, Wilson 1983). It is known that a number of duplicate, but variably complete, sets of Preiss specimens were compiled (see point 4 below) but how much of the duplicate material was seen by the various authors remains a mystery. We make the following observations on the Preiss collections and Steetz's herbarium:

1. Preiss's Australian collections in Steetz's herbarium are almost invariably numbered according to the sequence in *Pl. Preiss.* The only exception known to us is a collection of *Chthonocephalus pseudevax* Steetz, which due to a duplication of numbers is labelled as *Preiss 2414* but as *Preiss 2414b* in *Pl. Preiss.*

2. Steetz's herbarium contains mounted sheets of most of the Preiss collections he examined when compiling his accounts of the Compositae, Sterculiaceae (Buettneriaceae), Polygalaceae, Tremandraceae and *Fleischeria* Steud. (= *Sida* L., Malvaceae). For example, in his treatment of *Tetratheca* Sm. (Tremandraceae) Steetz cited 16 Preiss collections and all are represented in his herbarium. Only rarely are Preiss numbers for the above families missing from his herbarium. When absent it only appears to be in cases where a taxon is represented by more than one Preiss collection or where Steetz has reworked treatments originally published in *Pl. Preiss.* by Steudel, e.g. Polygalaceae and Sterculiaceae. Thus five of the 21 collections of *Comesperma* Labill. (Polygalaceae) have not been located in Steetz's herbarium. Steetz apparently still saw material, as indicated by his use of exclamation marks after collections cited in the text.

3. Steetz's herbarium contains numerous Preiss collections, including many types, from families which he did not treat in *Pl. Preiss.*, e.g. Caesalpiniaceae, Droseraceae, Myrtaceae, Papilionaceae and Sapindaceae (see table 1). For example 14 out of 21

Preiss collections of the Droseraceae and nine out of 23 Preiss collections of *Calothamnus* Labill. (Myrtaceae), cited by Lehmann (1845) and Schauer (1844) in their respective treatments in *Pl. Preiss.*, are to be found in the Steetz herbarium. 4. In a letter dated the 4 October 1843 Preiss wrote the following to Sir William Hooker (McGillivray 1975, p.15):

"I very much regret not having been able to collect of all species an equal number of specimens, and those persons, who want plants, appear to be dissatisfied not to get a *whole* collection of my plants. I have almost sold my plants, and I think, that those, which still remain, will also be parted with very soon. They consist of 17 Herbaria, containing: 996. 956. 920. 888. 867. 884. 836. 798. 767. 732. 728. 705. 685. 669. 645. 618. 595 species.

The numbers accompanying the plants I beg you to retain, as they exactly will agree with those of the enumeratio, which will soon be published." [(C) RBG Kew]

5. All of Preiss's Australian collections in the Steetz herbarium were obtained by Steetz in 1843. This is indicated by Steetz on the individual sheets (see table 1, Fig. 4, "emi 1843").

6. Duplicates of Preiss's collections are found in many herbaria. Although limited, observations by one of us (PSS) of type collections of Compositae described by Steetz have shown that the material of them in his own herbarium is as good as, or often better than, that in others such as LD, P or S. For example, *Preiss* 39, the type collection of the name *Pogonolepis stricta* Steetz, is represented in Steetz's herbarium by a sheet containing three large plants (Fig. 4). Duplicate collections seen in other herbaria consist of fewer or smaller plants, i.e. LD, a single plant; S, two plants; P, three plants but smaller; P (ex Herb. Schultz-Bip.), two plants.

In general all Preiss collections in the Steetz herbarium are of generous proportion and would, we suspect, compare favourably with duplicate specimens elsewhere. Crisp (1983) has independently noted that the types of the Compositae and also the Tremandraceae in Steetz's herbarium are generally better than those in LD.

7. Not all duplicates of Preiss specimens cited in *Pl. Preiss.* are annotated in Steetz's hand. For example the only syntypes of *P. stricta* annotated by Steetz are those in LD and S and of course in his own herbarium.

It is generally conceded that the standard reference set of specimens used for *Pl. Preiss.* is to be found in LD, with J. Agardh having purchased that part of Lehmann's herbarium after the latter's death in 1860 (Nordenstam 1980). The LD collection is also said to be the only set of Preiss collections to have been seen by all authors of *Pl. Preiss.*, a fact emphasised by O. W. Sonder in correspondence with N. J. Andersson of Stockholm (Crisp 1983). Although a number of authors of *Pl. Preiss.* have type material in their own herbaria it is therefore clear that when names in *Pl. Preiss.* are lectotypified the specimens at LD must be given serious consideration. Crisp (l.c.) has suggested that, all things being equal, the LD specimens should be chosen as the lectotype. In the case of names coined by Steetz it is apparent that specimens in his own herbarium should generally be chosen as lectotypes. Not only did Steetz obtain a set of Preiss's specimens in 1843, perhaps one of those alluded to in the letter cited above but in any event well before publication, his set apparently contains better specimens. Furthermore, having at his disposal such a good set it may be that it was primarily these collections upon which he based his descriptions, merely checking and annotating duplicate specimens. Lectotype specimens of a number of names have already been chosen from his herbarium (Short 1983, 1986, e.g. *Pogonolepis stricta*).

SCHOMBURGK, MORITZ RICHARD (1811-1891).

Stafleu & Cowan (1985) stated that Steetz contributed to Schomburgk's *Vers. Fauna Fl. Brit.-Guiana*. We have not seen this work but Mr C. R. Dunlop (in litt. 1986) found no reference to Steetz in this publication.

Only two collections attributable to Schomburgk and coming from Guyana have been located in Steetz's herbarium (see table 2).

SEEMANN, BERTHOLD (1825-1871).

Steetz was one of many collaborators for Seemann's *Bot. voy. Herald*, contributing treatments of the Compositae for both the Isthmus of Panama and the island of Hong Kong. In a letter to Asa Gray, dated 8 July 1854 Steetz stated that "Dr. Seemann communicated with me but a very few of his Panama Compositae, but promised me to procure some others of them. As soon as I receive doubles, I shall send them directly to you. I fear however that most of the novelties may be distributed already." A search of the MEL collections has so far revealed collections of only five species collected by Seemann in Panama, viz. *Elephantopus mollis* Kunth, *Melanthera microphylla* Steetz, *Pectis stricta* Willd., *Unxia digyna* Steetz and *Wedelia carnosia* Rich. Similarly only a few collections, e.g. *Blumea hieracifolia* DC. and *Vernonia solanifolia* Benth., from Hong Kong have been found in Steetz's herbarium. They were made by the British Botanist H.F. Hance and were received by Steetz from Seemann in 1857, the year in which Steetz's treatment of the Compositae of Hong Kong was published.

SHORT, CHARLES WILKINS (1794-1863).

Stafleu & Cowan (1985) list no fewer than 25 herbaria (but not MEL) which contain collections made by Short. Extensive collections (some hundreds) also exist at MEL and it is clear that most were acquired as part of Steetz's herbarium. As noted above and in table 2 Steetz acquired collections from Short on at least six separate occasions, i.e. the years 1837, 1838, 1841, 1843, 1844 and 1850. Some of Short's collections have come to MEL via O.W. Sonder's herbarium, having been forwarded to Sonder by Steetz, e.g. *Senecio balsamitae* Muhl. ex Willd. (= *S. aureus* L., MEL 1541370).

SIEBER, FRANZ WILHELM (1789-1844).

Sieber travelled widely, collecting plants in countries such as Austria, Italy, Crete, Egypt, Palestine, South Africa, Mauritius and Australia (Gunn & Codd, 1981; Stafleu & Cowan, 1985). His exsiccatae, of which Dietrich (1881) lists 23, frequently contain material collected by others. For example the collection of *Myrcia splendens* (Sw.) DC. var. *genuina* Berg. (MEL 1540721, table 2) is one of several sheets of South American Myrtaceae in Steetz's herbarium which was collected by F. Wrbna and distributed by Sieber as part of his 'Flor. Trinitatis' (Dietrich l.c.). Steetz's note on the sheet erroneously states that the collection was made by Sieber.

By far the majority of Sieber collections in Steetz's herbarium were acquired in 1836 through the auspices of C. F. Ecklon. They come from many countries (tables 1-3) but just how they were acquired by Ecklon is unknown. Steetz presumably purchased them from Ecklon during the latter's stay in a house in the Hamburg Botanic Garden from 1833 to 1837 (Gunn & Codd, l.c.). Other Sieber collections acquired by Steetz came via Böckmann in 1838 and Buek in 1835.

SIEMSEN, G. THEODOR (dates unknown).

Siemssen was a merchant of Hamburg and a friend of Steetz. He worked for some time from Batavia (Jakarta) and during this period of his life visited Australia (table 1), taking the opportunity to collect and forward plants to Steetz (Steetz 1845b, p. 467). He collected in the vicinity of Port Jackson and gathered material of *Eurybia ericoides* Steetz [= *Olearia ericoides* (Steetz) N. A. Wakefield] from the environs of Hobart (MEL 1538904, *Pl. Preiss.* 1: 423) and *Stenanthera conostephioides* Sond. [= *Astroloma conostephioides* (Sond.) Benth.] from Port Adelaide (MEL 648098, *Pl. Preiss.* 1: 296). Part of the latter collection was forwarded by Steetz to Sonder for description. Siemssen also collected in China (table 2).

Steetz honoured his friend by naming the genus *Siemssenia* Steetz (Compositae) after him. The only species recognised, *S. capillaris* Steetz, is generally referred to *Podolepis* Labill. but the genus is likely to be reinstated (Short, unpubl.).

As indicated in the memorandum relating to the purchase of Steetz's herbarium Siemssen acted as trustee to Steetz's widow. Ferdinand Mueller (1865), following acquisition of the herbarium, described *Aster siemssenii* F. Muell. [= *Olearia viscidula* (F. Muell.) Benth.] from material gathered by Siemssen at Port Jackson in 1838 and forwarded to Steetz.

SINCLAIR, ANDREW (1796-1861).

A letter by Steetz to Joseph Hooker, sent from Hamburg and dated 8 November 1856, reads in part:

"You favour me with a new offering on account of New Zealand plants, and I must confess, that it is a most acceptable one, because my Herbarium contains no more of the Flora of these interesting Islands, than a very small parcel, collected by Mr. Sinclair, and communicated to me by Mr. Gourlie last autumn during my visit in Glasgow, and because *your* plants, being the originals of your excellent Flora Novae Zeelandiae would be of the greatest interest to me."[(C) RBG Kew]

Sinclair, originally a surgeon with the Royal Navy, first collected in New Zealand in 1841 when, during the visit of the Antarctic Expedition, he accompanied Joseph Hooker and the Rev. W. Colenso on botanical excursions. He later became the Colonial Secretary (1844-1856) to New Zealand and devoted much of his leisure time to botanical pursuits. He continued to pursue these interests on his retirement and was drowned during a collecting expedition in the Southern Alps (Hooker 1864; Cheeseman 1906; Staffeu & Cowan 1985). Sinclair collected very copiously in the Bay of Islands, the Auckland districts, and in the Nelson Mountains.

The National Herbarium of Victoria contains a number of Sinclair collections and it is clear from annotations on the sheets that specimens have been obtained via J. D. Hooker, O. W. Sonder's herbarium and the Steetz herbarium. However the Hooker specimens have not necessarily come, as indicated in the above letter, via the Steetz herbarium. There is nothing on specimens we have examined to indicate this origin. It may be that all were sent directly to Mueller (1888). On the other hand, although some caution is necessary in attributing them solely to Steetz's herbarium, Sinclair collections that came via Gourlie and then Steetz's herbarium are readily distinguished by the printed labels (see above and tables 2 & 4, Fig. 8).

TURCZANINOW, NICOLAI STEPHANOWITSCH (1796-1864).

In the 1840's and 1850's the Russian botanist Turczaninow described as new a number of Australian plants from collections purchased from James Drummond (Black, 1935). Duplicate collections of those seen by Turczaninow are found in a number of herbaria, e.g. BM & K, and it is these, which were not examined by Turczaninow, that are frequently examined by both past and present botanists. Thus Bentham (1863) noted that "of the important and extensive West Australian collections of Mr. James Drummond I have had for examination complete sets of excellent specimens in the Kew Herbaria and in the majority of instances I have seen them in different sets so as to check the one with the other. I have thus been enabled to identify nearly the whole of the species published by Turczaninow" (p. 10).

A species folder of *Comesperma calyinega* in Steetz's herbarium contains small envelopes with fragments of *Drummond 429* and *Drummond 487*. There is no information as to their origin. However Steetz obtained some Drummond collections from Turczaninow. For example type specimens of *Thomasia triloba* Turcz. (MEL 1539808; table 1) and *Ditomostrophe angustifolia* Turcz. (MEL 1539813), both in the Sterculiaceae, are in Steetz's herbarium. Steetz noted on the sheets that he obtained both collections from Turczaninow in 1848. He also referred, on the herbarium sheet, to correspondence with Turczaninow in 1849 about the specimen of *D. angustifolia*. Steetz (12 April 1853) noted in a letter to Asa Gray that he had obtained some of Drummond's collections of the Compositae from Turczaninow. Specimens, e.g. of *Pachysurus multiflorus* Turcz. (MEL 543201) and *Chry-*



flor. Hamburg
1824.

1141. *Asplenium filix femina* Roth.
Polypodium filix feminae.
Pteris palustris Poir.
Athyrium filix femina L.
flor. Halens.
des Schleier
1826.
Spreng 248 v. 4 pag 88.



Nom Vernac.
Buka Buka

HERBARIUM J. STEETZ
[1804-1862]

BRACHYGLOTTIS REPANDA, Forst.
Northern Island, New Zealand
ANDREW SINCLAIR Esq., M.D.
FROM WILLIAM GOURLIE, Glasgow

Dr Steetz, Hamburg.
with W. Gourlie, kind regards.

NATIONAL HERBARIUM OF
VICTORIA (MEL), AUSTRALIA



Fig. 8. Upper — Label in Steetz's hand accompanying specimen of *Athyrium filix-femina* (L.) Roth. (MEL 1540787). Presumed to be from a folder originally containing a number of separate collections. Lower — Specimen of *Brachyglottis repanda* Forster & Forster f. (MEL 1540568). Collection by A. Sinclair, communicated to Steetz by W. Gourlie.

socoryne uniflora Turcz. (MEL 541599), have been located at MEL. All are accompanied by a label in Turczaninow's hand. A pencilled date "1852", in what we believe is Steetz's hand, occurs on each label and is presumably the date of receipt of the specimens from Turczaninow. A pencilled "B" also occurs on the original labels accompanying the specimens of the Compositae, indicating that they were seen by Bentham for his account of the family in *Fl. Australiensis*.

As well as the Drummond collections Steetz's herbarium contains specimens gathered by Turczaninow from Siberia, e.g. *Aster tataricus* (table 2).

The assistance given by Turczaninow was well received by Steetz who assisted his friend by attempting to acquire specimens for him. Thus in a letter Steetz (12 April 1853) asked Asa Gray whether it was possible to acquire a specimen of *Dionaea muscipula* Ellis (Droseraceae) for Turczaninow. Steetz had "no more than a morsal of this rare plant" in his own herbarium. (The collection, MEL 1552858, has been located. It consists of a single plant and was acquired from C. W. Short in 1838.) It is also probably safe to assume that Turczaninow received plant specimens directly from Steetz, particularly in view of their common interest in Australian Compositae. Steetz also helped Turczaninow try and locate a missing consignment of specimens from Bentham. A letter from Steetz to Bentham, dated 21 August 1854, reads in part:

"Yesterday I received a letter from my friend Turczaninow from Kharkow, dated August 2nd, by which he informed me of you having mentioned to him in a letter of the 6th of June, 1853, that you intended to send to him in spring, the second part of the last collection of Spruce's North-Brazilian plants, and other plants of your own herbarium. By the unfortunate war [Crimean War] which has commenced last spring, you may be prevented to do so. My friend deplores much, that his interesting communication with England by the same circumstances has now been interrupted, and entreats me, to intermediate his correspondence with you. He wishes most anxiously, that you may have the kindness of addressing to me all parcels of plants destined for him, and I add, that, when you are willing to do so, I shall be delighted to forward them directly to him, and thus to do a favour to our mutual friend, who much regrets, to have nothing received from any foreign country since a very long time."[(C) RBG Kew]

In the same year Steetz also approached R. F. Hohenacker on the matter of missing consignments of plants destined for Turczaninow (see Appendix).

INDEX OF CONTRIBUTORS (DIRECT & INDIRECT) TO STEETZ'S HERBARIUM

Page numbers in bold refer to text, those in roman refer to the tables.

- | | |
|--|--|
| Achtaich 462 | Comien 460, 461, 464, 465, 468 |
| Andersson, N.H. 461, 470 , 482 | Coquebert de Montbret, A.F.E. 465 |
| Bachofen 464 | Coulter, T. 466 |
| Bartling, F.G. 460 | Crouan, H.M. 480 |
| Bauer, F.L. 458 | Crouan, P.L. 480 |
| Baumgarten, J.C.G. 464 | Deisch, J.G. 461 |
| Beyrich, H.C. 466 | Dolliner, G. 463 |
| Benecke, ? F. 468 | Drège, J.F. 464 |
| Binder, N. 480, 481, 483 | Drummond, J. 458, 488 |
| Blandowski, J.W.T.L. 458 | Durand, E.M. 466, 469, 478 , 479 |
| Bockmann, ? C.W. 463 | Ecklon, C.F. 457, 459, 460, 463, 464, 465, 467, 468, 469, 487 |
| Boeck, C.P.B. 469 | Engelmann, G. 466 |
| Boek, ? C. 464 | Fallati 481 |
| Boissier, P.E. 465 | Fendler, A. |
| Bolle, C.A. 479, 482 | Fischer, F.E.L. von 466 |
| Born 465 | Flügge, J. 461 |
| Broussonet, P.M.A. 463 | Frivaldszky von Frivald, E. 462, 463, 469 |
| Buchinger, J.D. 461, 468 | Froelich, F.H.W. 467, 481 |
| Buck, J.N. 460, 464, 465, 466, 468, 481 | Gaedeckens 480 |
| Calder, A.L. 467 | Giesecke, ? C.L. 461 |
| Candolle, A.L.P.P. de 463 | |

- Gourlie, W. 464, 478, 479, 483
 Grabowski, H.E. 461
 Gray, A. 466
 Greve 468
 Gundlach, J.C. 460
 Gunn, R.C. 458
 Häcker, G.R. 461
 Hampe, G.E.L. 461
 Hance, H.F. 462, 487
 Hartlinsky 462
 Hartung, ? N. or H 461
 Henry, T.C. 466
 Heuffel, J.A. 464
 Hochstetter, C.F. 462
 Hofman-Bang, N. 468, 480
 Hohenacker, R.F. 465
 Hooker, J.D. 458, 483, 488
 Hoppe, D.H. 460
 Hornung, E.G. 468, 469
 Hübener, J.W.P. 461, 463, 469, 480
 Huguenin, A. 461
 Karelín, G.S. 465
 Kern, ? J. 465
 Kirilov, I.P. 465
 Klotzsch, J.F. 460, 462, 467
 Kohlmeyer 459, 461, 462, 465, 468, 469
 Kroeber 461, 468
 Kunth, ? K.S. 464
 Kunze, G. 465
 Kützing, F.T. 463
 Labillardière, J.J.H. de 458
 Laestadius, L.L. 465
 Lagger, F.J. 465
 Lang 469, 479
 Lawrence, R.W. 458
 Lehmann, J.G.C. 457, 464
 Leiblein, V. 468
 Leiboldt, F.E. 458
 Lelièvre 464
 Lenormand, S.R. 480, 481
 Lessing, C.F. 463
 Leybold, F. 463
 Liebmann, F.M. 463
 Lüben, A.
 Lucae, ? A.F.T. 468
 Lüders, F.G.T. 466
 Luetckens 462
 Martin 460
 Mead, S.B. 466
 Meatzel 460
 Milde 461, 462, 463, 464, 469
 Minder 461, 468
 Moritz, J.W.K. 457, 460, 467, 479, 483
 Morsch, ? H. 459
 Müller, R. 461
 Müller, U.I. 463, 469
 Nonnenprediger 460
 Noodt 465
 Nyman, C.F. 465
 Otto, C.F.E. 460, 467
 Panzer, G.W.F. 468
 Pappe, C.W.L. 465
 Peters, W.C.H. 463, 470, 484, 485
 Philippi, ? F. or R.A. 460, 478
 Phoebus, P. 465
 Pohlmann, H.C.F. 479
 Preiss, J.L. 457, 458, 465, 485, 486
 Rablik, J. 461
 Ravn, P. 481
 Richter, ? H.E.F. 468, 479
 Rieder, J.G. von 466
 Robert, ? G.N. 461
 Rochel, A. 457, 462, 464, 469
 Römer, F.A. 480
 Ruete 464
 Salzmann, P. 463
 Schaffner, W. 463
 Schimper, G.H.W. 460
 Schlechtendal, D.F.L. von 460
 Schlüter, ? F. 461, 462, 479
 Schmidt, J.A. 462
 Schomburgk, M.R. 462, 486, 487
 Schön, ? G. 480
 Schönheit, F.C.H. 468
 Schultes, D. f. 467
 Schultz, C.H.
 Schütze, G. 469, 479
 Seelos, G. 463
 Seemann, B. 462, 464, 487
 Short, C.W. 457, 466, 467, 469, 478, 479, 487, 490
 Shuttleworth, R.J. 465
 Sickmann, J.R. 464, 469
 Sieber, F.W. 459, 460, 463, 465, 467, 468, 469, 487
 Siedenburger 466
 Siemssen, G.T. 459, 460, 487, 488
 Sinclair, A. 464, 478, 479, 488
 Sonder, O.W. 458, 461, 462, 463, 464, 465, 466, 468, 469
 Spruner, W. von 462, 469
 Stannius, H.
 Steetz, J. 462, 468, 480
 Stein, J.C. 465, 469
 Steven von, ? C. 468
 Suhr, J.N. von 480
 Thomson, T. 463, 483
 Thorey, D. 460, 462, 479, 481
 Thurber, G. 467
 Tommasini, M.G.S. 463, 469
 Townsend, D. 467
 Treviranus, L.C. 462
 Turczaninow, N.S. 457, 458, 465, 466, 488, 490
 Uelm 468
 Vahl, J.L.M. 457, 462, 464
 Wallich, N. 463
 Weihe, C.E.A. 462
 Weiz, S. 460
 Wenck, ? E. 460
 Wendland, H.L. 459
 Werner 463
 Wierzbicki, P. 469
 Wiest, A. 462
 Wikström, ? J.E. 465
 Willkomm, H.M. 465
 Wimmer, ? C.F.H. 460
 Winthem, W. von 461, 464
 Wröbna, F. 465
 Wright, C. 466
 Zeyher, C.L.P. 457, 464
 Zuccarini, J.G. 458

ACKNOWLEDGEMENTS

We thank our colleagues at MEL, particularly Miss H. Cohn, Mrs R. Kilgour, Mrs M. Powell and Miss K. Wilson. We also acknowledge the use of lists and notes on botanists compiled by Dr J. H. Willis and Mr A. B. Court during their years at MEL.

Assistance from the following was gratefully received:

The Director of the Gray Herbarium (GH) and Ms B. Callahan for forwarding copies of Steetz's letters to A. Gray and permission to publish extracts; The Director and Trustees of the Royal Botanic Gardens, Kew (K) for permission to cite extracts [copyright, RBG Kew] of letters from Mueller to Bentham and from Steetz to Bentham and J. D. Hooker; Dr H. M. Burdet (G) for forwarding copies of letters from Steetz to de Candolle, Hohenacker and Müller; Mr C. R. Dunlop (DNA) and Mr N. Lander (PERTH), former Australian Botanical Liaison Officers at K, for their help in locating publications and unpublished correspondence; Prof. K. Kubitzki (HBG) and Prof. H. Strümpel for information on Steetz's insect collection and his publication on Winthem in *Entomol. Zeitung*; Prof. B. Nordenstam (S) for obtaining copies of correspondence from Steetz to Andersson and for verifying that labels on sheets at MEL are in Andersson's hand; Dr K. Werner (HAL) for forwarding copies of letters by Steetz to Schlechtendal; Dr P. Wiemann (HBG) for forwarding copies of letters from Steetz to Lehmann, Bischoff, Binder, Siemens and von Struve; Mrs K. Wilson (NSW) for a translation of the preface to Lehmann's *Pl. Preiss*.

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APPENDIX STEETZ'S UNPUBLISHED CORRESPONDENCE

Copies of Steetz's letters (including English translations) consulted for this publication are held at MEL. Summaries of their content have also been compiled. However, permission to consult and cite extracts from letters is generally required from the institution holding the originals. Letters consulted by us are listed alphabetically by recipient.

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Manuscript received 23 February 1987.

THE LICHEN GENERA *HEPPIA* AND *PELTULA* IN AUSTRALIA

by

REX B. FILSON*

ABSTRACT

Filson, Rex B. The lichen genera *Heppia* and *Peltula* in Australia. *Muelleria* 6(6): 495-517 (1988). – The Australian species of *Heppia* and *Peltula* are revised. Descriptions and illustrations are presented together with distribution maps for each species. *Heppia brisbanensis* F. Wilson is placed in synonymy with *Heppia lutosa* (Ach.) Nyl., *Heppia placodizans* Zahlbr. is placed in synonymy with *Peltula decorticans* (Müll. Arg.) R. Filson, *Peltula obscurans* Nyl. is placed in synonymy with *P. euploca* (Ach.) Wetmore and the new combination *Peltula subglebosa* (Müll. Arg.) R. Filson is made for the taxon now known as *P. obscurans*. *Heppia acarosporoides* Müll. Arg., *H. deserticola* Zahlbr. and *H. hassei* Zahlbr. are placed as synonyms of *Peltula subglebosa*. *Peltula imbricata* R. Filson is described as new.

INTRODUCTION

In this paper one species of *Heppia* and nine species of *Peltula* are discussed. These genera have been poorly collected in Australia and records have often been obtained because they have been gathered with other more discernible soil-inhabiting lichens.

Previously these two genera have been placed in the lichen family Heppiaceae (Wetmore 1970; Poelt 1974; Henssen 1974). Marton and Galun (1981) have shown that differences in apothecial ontogeny suggest that this is not a natural family but they temporarily keep the genera together in a "convenience group". Büdel (1987), in discussing the biology and systematics of this group in South Africa, concludes that the ontogenetical differences are sufficient to divide the group into the Heppiaceae and the Peltulaceae.

These lichens frequent damp habitats on soil and rock in arid areas (Wetmore 1970) and are found in the drier parts of all states of Australia. On soil they are usually found in local run-off areas. On rock they are most often seen close to the soil or growing on pockets of soil contained in depressions or hollows in the rock.

MORPHOLOGY

The thallus of *Heppia* and *Peltula* is squamulose. Based on morphological and anatomical characters the squamules can be differentiated into three forms; clavate, ligulate and peltate (Büdel 1987). Only the clavate and peltate forms are represented in the Australian collections.

1. The thallus of the clavate type is subfruticose, the individual lobes are club-shaped, hollow and unbranched or only simply branched. These thalli are attached to the substrate by an adhesion disk (Büdel 1987).

2. The thalli of the peltate type have peltate lobes and are attached to the substrate by an umbilicus or by rhizines. With thalli growing on earth the rhizines consist of thin, pale brown, short-celled hyphae which are septate, branched and anastomosing. These rhizines are matted or sometimes become joined together into fasciculate bundles which form a thick central cord penetrating deep into the substrate. Both rhizines and cords are extremely difficult to see as often they intermix with sand and rock fragments and only careful washing will enable the complete structure to be observed. With thalli growing on rock two forms of attachment are evident; sometimes (if the rock surface is loose) the rhizines are similar to those growing on soil or sometimes (if the rock surface is hard) the lower cortex extends down to form an umbilicus. The holdfast on very small squamules can almost cover the lower surface, but as the thallus develops, the ratio of holdfast to lower surface becomes less. In the smaller species, like *Peltula omphalodes*, there are sometimes two or three corticate holdfasts.

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Swinscow and Krog (1979) state that a cortex is present in all species of *Peltula* growing in East Africa. Büdel (1987) says that in some species the upper cortex is replaced by an epinecral layer. In Australia it appears that *Heppia lutos*, *Peltula australiensis*, *P. bolanderi*, *P. decorticans*, *P. imbricata*, *P. patellata*, *P. subglebosa* and *P. zahlbruckneri* have, at least in part, a distinct cortex one to three cells thick and a separate algal layer whereas *Peltula euploca* and *P. omphaliza* have a zone which I have termed the "upper layer". This layer is composed of paraplectenchymatous cortical cells interspersed with algal colonies. *P. omphaliza* has an almost homomerous thallus, the medulla sometimes being almost indistinguishable from the thick upper layer.

All species within this group contain unicellular blue-green algae. Wetmore (1970) says that the phycobiont in *Heppia* is *Scytonema* whereas in *Peltula* it is *Anacystis*. However Bubrick and Galun (1984) present evidence from cultures which shows that several strains of *Gloeocapsa* are present in *Peltula*. In fact they found two distinct strains of *Gloeocapsa* in *P. polyspora* [*P. patellata*] from different geographical regions. The influence of the algae on the thallus produces the deep olive coloration which renders the thallus almost invisible on some soils and is possibly the reason why this group is so poorly collected.

The medulla in *H. lutos*, *P. australiensis*, *P. patellata* and *P. decorticans* (Fig. 4h) is paraplectenchymatous (Degelius 1954:43) whereas the medulla in *P. bolanderi*, *P. euploca*, *P. imbricata* (Fig. 6c), *P. omphaliza* and *P. zahlbruckneri* is euthyplectenchymatous. This difference appears to be a reliable diagnostic feature in separating *P. decorticans* from the "*omphaliza* - *zahlbruckneri* complex". The medulla of *Peltula subglebosa* sometimes appears to be totally composed of paraplectenchymatous tissue although there is often a thin section of euthyplectenchymatous hyphae in the centre (Fig. 9h).

Specimens of *Peltula decorticans* were found to be parasitised by an unknown species of *Endococcus* (Hawksworth pers. comm.).

TAXONOMY

KEY TO SPECIES OF HEPPIA AND PELTULA IN AUSTRALIA

1. Thallus saxicolous
 2. Thallus sorediose
 3. Thallus squamulose; medulla euthyplectenchymatous
 4. Thalli usually solitary; margins of squamules usually downrolled; soredia blue-grey to brown *P. euploca*
 4. Thalli usually clustered; margins of squamules flexuose and usually upturned; soredia brown to black *P. bolanderi*
 3. Thallus areolate; medulla paraplectenchymatous (margins of thallus placodiform; margins of areolae slightly raised; soredia brown to black) *P. decorticans*
 2. Thallus not sorediose
 5. Medulla totally euthyplectenchymatous
 6. Thallus squamulose; apothecia to 0.75 mm diam *P. omphaliza*
 6. Thallus subfruticose; apothecia to 0.25 mm diam *P. zahlbruckneri*
 5. Medulla paraplectenchymatous, sometimes with a thin central band of euthyplectenchymatous hyphae *P. subglebosa*
1. Thallus terricolous
 7. Ascospores numerous in ascus
 8. Thallus lobes > 1 mm diam., discrete
 9. Ascospores globose
 10. Epithymenium K+ red *P. patellata*
 10. Epithymenium K- *P. australiensis*
 9. Ascospores ellipsoid *P. subglebosa*
 8. Thallus lobes < 1 mm diam., imbricate *P. imbricata*
 7. Ascospores eight in ascus *H. lutos*

HEPPIA

Heppia lutos (Ach.) Nyl., Syn. Lich. 2: 45 (1855). - *Collema lutosum* Ach., Syn. Lich.: 309 (1814). TYPE: Germany, "ad terram limosam". HOLOTYPE: "Germania" (H-ACH 1901, photo only seen).

Heppia brisbanensis F. Wilson, Qld. Bot. Bull. 7: 32 (1891). TYPE: "On bare earth amidst grass, Hill End, South Brisbane, Queensland J.F. Shirley". LECTOTYPE (here chosen): "On earth in large patches, Dornoch Terrace nr river" on specimen sheet in Shirley's handwriting and on the outside of the packet in F.R.M. Wilson's handwriting "on earth at Hillend, South Brisbane, Q. by J. Shirley 1890" (NSW 1286!).

Thallus squamulose, grey to olive, sometimes forming a rosette-like group; squamules irregularly round to elongate, to 8 mm diam., concave or flat; margins slightly prominent, sometimes becoming granular sorediose; upper surface smooth, becoming rough and cracked with age; lower surface covered with a dense mat of hyphae right to the margins; hyphae pale brown, branched, anastomosing, septate, to 35 μ m thick; upper cortex to 30 μ m thick; algal cells scattered throughout the cellular medulla. *Apothecia* one to many per squamule, immersed, to 1 mm diam.; margin not prominent; disk concave to flat, pale reddish-brown; hymenium up to 100 μ m tall; paraphyses to 4 μ m thick with expanded apices; asci 65-80 x 15-25 μ m, 8-spored; ascospores simple, hyaline, ellipsoidal, 15-22(-30) x 6-13 μ m.

REACTIONS: Thallus K —, C —, KC —, P —; hymenium I+ pale blue becoming wine red; epihymenium K —.

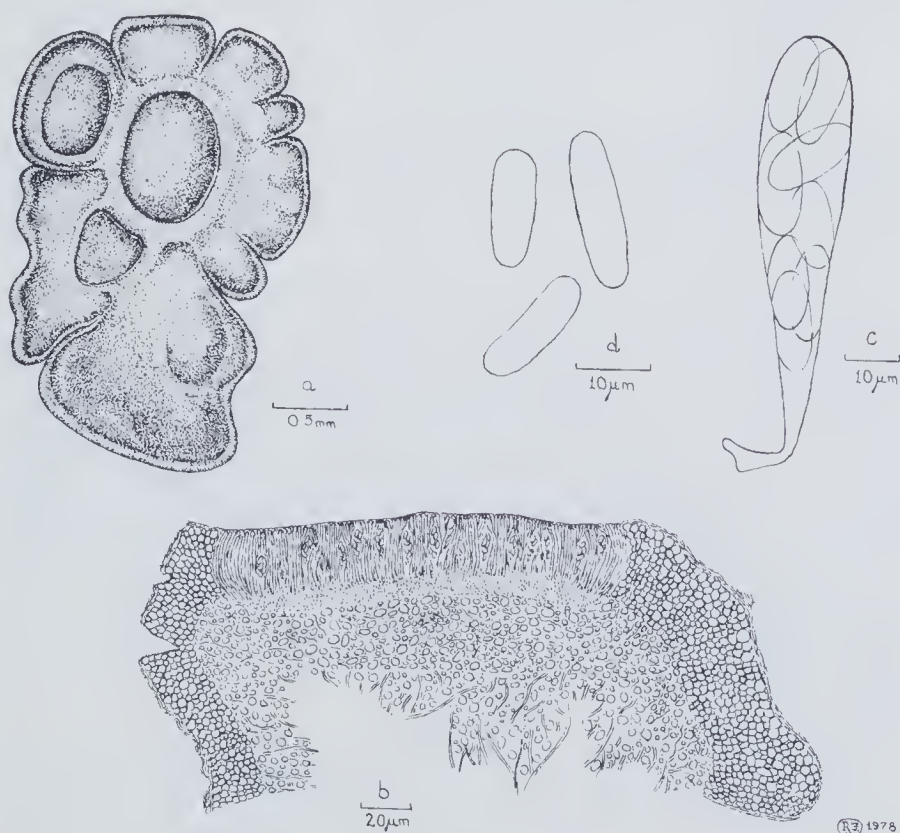


Fig. 1. *Heppia lutosa*. a — thallus from above showing habit. b — section of thallus and apothecium. c — ascus. d — ascospores. From lectotype of *Heppia brisbanensis*, NSW 1286.

DISCUSSION:

In the field it is difficult to distinguish between the genera *Heppia* and *Peltula*, as macroscopically *H. lutosa* is almost impossible to separate from *P. australiensis* and *P. patellata*. The only positive means of distinguishing between them is with the microscope. In *Heppia* the ascus contains eight spores and does not have a gelatinous sheath (Fig. 1c). *Peltula* on the other hand is polyspored and has a lacerate, gelatinous sheath around the ascus (Fig. 4e). This sheath, however, is indiscernible in some preparations, particularly when the hymenium is difficult to separate.

There is no specimen representative of *Heppia brisbanensis* in Shirley's lichen books in BRI. However, the specimen in NSW has both Shirley's and Wilson's handwriting on the labels, so it seems pertinent to select it as lectotype.

SELECTED SPECIMENS EXAMINED (total 14):

Western Australia – 27 miles SW. of Anna Plains, SW. Broome, 9.viii.1965, A.C. Beauglehole 13956 (MEL 1028846); Point Samson, N. Roebourne, 17.viii.1965, A.C. Beauglehole 14023 (MEL 1028824); Knox Gorge, Hammersley Range, 15.viii.1965, A.C. Beauglehole 14004 (MEL 1028813).

South Australia – Tomkinson Ranges, c. 15 km by road E. of Pipalyatjara, 5.ix.1978, N.N. Donner 6717 (MEL 1027035); 15 miles S. of Mt Hopeless Well and Outstation, 11.ix.1966, R.W. Rogers 540 (AD); Lake Torrens Basin, Roxby Downs Station, (c. 120 km NNW. of Woomera, collected from sandy clay soil on top of stony ridge just S. of Centenary Hut, 8.iv.1973, R.D. Seppelt 2442 (AD).

Queensland – Red Falls, Lolworth Creek, 58 km WNW. of Charters Towers, on basalt rock on great basalt wall, with scattered trees & shrubs, 21.vi.1986, J.A. Elix 20527 & H. Streimann (ANUC); Lake Julian Road, 20 km NE. of Mt Isa, in sheltered rock crevices in gorge in *Eucalyptus* woodland with *Triodia*, 24.vi.1986, J.A. Elix 20522 & H. Streimann (ANUC); 10 miles S. of Charleville, soil in open Mulga woodland, 12.iv.1972, R.W. Rogers 1965 (BRIU).

PELTULA

Peltula australiensis (Müll. Arg.) R. Filson, Lich. S. Austr.: 142 (1979). – *Heppia australiensis* Müll. Arg., Hedwigia 5: 193 (1892). TYPE: "Ad terram in Western Australia, prope Everard Ranges: Helms n.35". HOLOTYPE: "No.35. West Austral: F.v. Muller 1892 28/5/91 R. Helms" (G!). ISOTYPE: "No 35 28/5/91 R. Helms" (MEL 5780!).

Thallus squamulose, terricolous, to 2.5 mm diam., deeply concave or flat; margins smooth, entire or lobed, usually thickened and up-turned; upper surface rugulose, olive-green to brownish-green, sometimes appearing pruinose; pruina yellow or white; lower surface covered with hyphae which penetrate the substrate; hyphae pale brown, septate, branched and anastomosing, to 35 µm thick and 7 mm long; upper cortex 15-20 µm thick; algal layer discontinuous, 90-100 µm thick; lower cortex to 60 µm thick; medulla paraplectenchymatous. *Apothecia* immersed, usually one per squamule but occasionally as many as five, to 1.5 mm diam.; disk flat to convex, pale red to brown to almost black; margin sometimes prominent, sometimes absent; hymenium up to 150 µm tall including the yellow-brown epihymenium; asci 100-126 x 21-24 µm with a thick gelatinous sheath; ascospores numerous in asci, globose, simple, hyaline, 5-8 µm diam.

REACTIONS: Thallus K–, C–, KC–, P–; epihymenium K–; hymenium I+ blue becoming brick-red.

DISCUSSION:

Peltula australiensis has the same general appearance as the other soil-inhabiting species of this group in Australia. It is similar to *P. patellata* and like it varies greatly in thallus size and shape. It can be a small squamule completely dominated by a large apothecium or it can be a large, many-lobed, almost polyphyllous thallus with several immersed apothecia. *P. australiensis* and *P. patellata* can only be separated from each other by the chemical reaction on the epihymenium. There are some minor differences in these species which may prove to be significant over

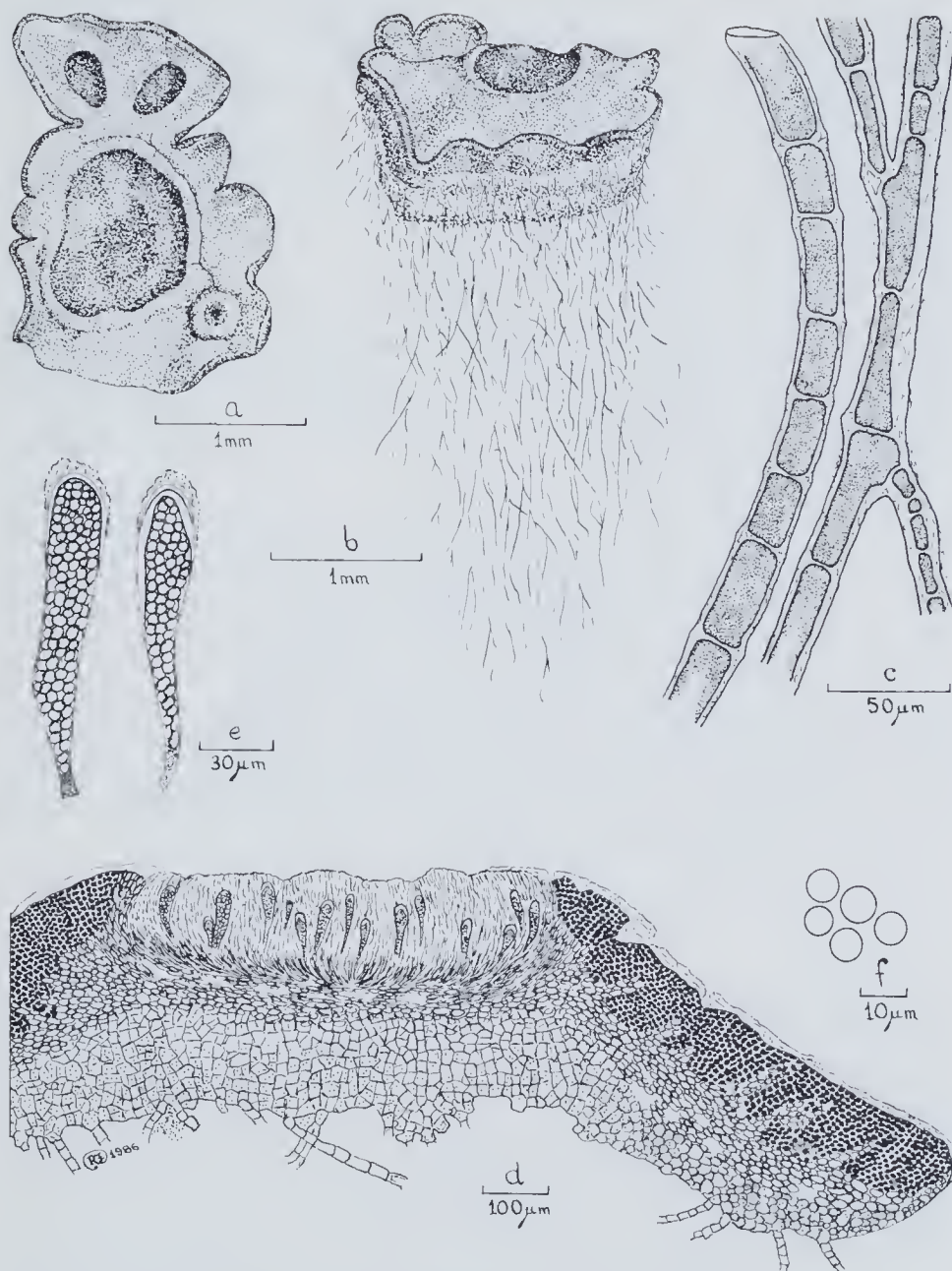


Fig. 2. *Peltula australiensis*. a — thallus from above showing lobed margins and apothecia. b — thallus from side showing branched hyphae penetrating deep into the substrate. c — septate hyphae from the lower surface, showing one branched and anastomosing. d — section through thallus and apothecium. e — asci. f — ascospores. All from MEL 1011768.

a wider range of specimens. The thallus of *P. patellata* appears to be thicker and the apothecia a little larger with higher hymenium, larger asci and larger ascospores. It is possible that these two species could be considered varieties of the one taxon but specimens of both chemotypes have not been collected at the same locality.

SELECTED SPECIMENS EXAMINED (total 13):

Northern Territory – On earth on high hill NW. of Alice Springs High School, 14.ix.1965, *J.H. Willis* (MEL 11248); Levi Range, near Wallara Ranch, 17.vii.1968, *A.C. Beaglehole* 27145 (MEL 1045790); Mount Olga, 23.iv.1970, *J.R. Brownlie* (MEL 37805).

South Australia – By the side of Everard road, 16 miles W. of Stuart Highway, 23.xi.1975, *Rex Filson* 15641a & *Sue Filson* (MEL 1018606); Wilgena Hill, 6.5 km N. of Kingoonya – Tarcoola road, 67 km W. of Kingoonya, 26.x.1970, *Rex Filson* 11929a (MEL 1018619); Koonamore Vegetation Reserve, 4.viii.1969, *R.W. Rogers* 1725 (MEL 1011695).

New South Wales – Manara Hills on Mount Manara Station, 66 km N. Ivanhoe, 10.xi.1972, *Rex Filson* 14547 (MEL 1011768).

Peltula bolanderi (Tuck.) Wetmore, Ann. Mo. bot. Gdn. 57: 179 (1970). – *Pannaria bolanderi* Tuck., Gen. Lich.: 51 (1872). – *Heppia bolanderi* (Tuck.) Vainio, Acta Soc. Fauna Flora fenn. 7: 215 (1890). – *Pannariella bolanderi* (Tuck.) Gyelnik, Reprium nov. Spec. Regni. veg. 38: 307 (1935). TYPE: “California. Ukiah, on rocks, Bolander 242”. HOLOTYPE: on the accompanying label in Tuckerman’s writing “California 242 Bolander.” and on each of the two specimens “242 Ukiah rare” presumably in Bolander’s writing (FH!).

Thallus squamulose, saxicolous, usually clustered, peltate, irregularly round to 3 mm diam., monophyllous, attached to the substrate by a central holdfast; margins at first smooth, entire, lobed or slightly lacerate, becoming flexuose, often upturned and sorediate, sometimes with laminal soralia; upper surface olive-green to dark olive-brown, shining, smooth becoming rugulose and cracked with age; soredia farinose to granular, greyish-brown to brownish-black; lower surface smooth to rugulose, pale pinkish-brown to reddish-brown to dark brown; upper cortex to 15 μm thick; algal layer 60–120 μm thick; medulla euthyplectenchymatous; lower cortex 15–30 μm thick. *Apothecia* 1–3 per areolae, punctiform at first, becoming slightly open, to 0.2 mm diam.; disk light yellowish-brown; margin becoming slightly raised at maturity; hymenium 140 μm tall at the centre; asci polyspored, 84–87 x 12–18 μm ; ascospores globose to ellipsoid, simple, hyaline, 3–4 x 4–7 μm . *Pycnidia* spherical, 150 μm diam.; microconidia not seen.

REACTIONS: K – , C – , KC – , P – ; epihymenium K – ; hymenium I + red.

DISCUSSION:

Peltula bolanderi is very similar to *P. euploca* in that it is saxicolous, has small punctiform apothecia and a euthyplectenchymatous medulla. It differs, however, in its habit of growth. The thalli of *P. bolanderi* are much smaller and grow together in clustered colonies and the margins of the thallus are more often upturned and flexuose. Soredia form late so that often in a colony more than half of the thalli are not sorediate. The margins of the apothecia become slightly raised at maturity whereas in *P. euploca* the margin is never raised although the thallus sometimes thickens around the apothecium.

The type is represented on one small pebble and several small fragments glued to two separate paper slips. Both slips are annotated “242 Ukiah rare”. The apothecia on these specimens appear to be a little more prominent than those on the other material which I have seen. The apothecia on Australian specimens, although not as prominent as those on the type material, compare favourably with those on extra-Australian specimens determined as this species.

A specimen collected east of Alice Springs (MEL 1017825) appears to be a variant as the thallus, although having a flexuose margin, has very convex thalli which are heavily white-pruinose.

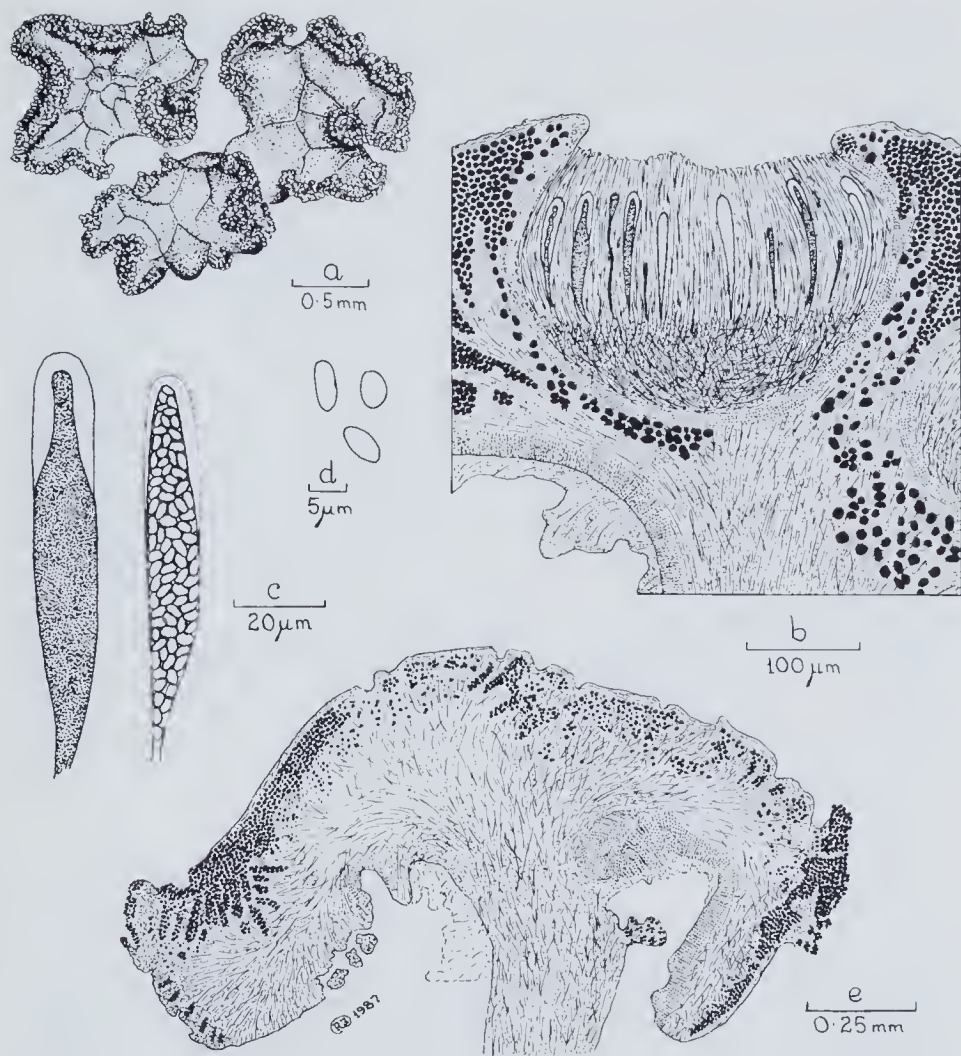


Fig. 3. *Peltula bolanderi*. a — habit of thalli from above. b — section through an apothecium. c — two asci from the hymenium. d — ascospores. e — section through thallus. a, e, from *Elix 11070* (ANUC); b - d, from *Elix 20713* (ANUC).

SPECIMENS EXAMINED:

Western Australia — 50 km NW. of Mt Elizabeth Station on the track to Bachsten Creek, Central West Kimberlies, 17.vi.1987, S. Forrester (MEL 1051644).

Northern Territory — W. face of Ayers Rock, on sandstone, 10.ix.1983, J.A. Elix 11070 & L.A. Craven (ANUC); S. facing side of schistose outcrop, 4 km E. Alice Springs, 26.ii.1976, P.K. Latz 6414 (MEL 1017825).

South Australia — By side of road, 16 miles W. of Stuart Highway, Everard Ranges, 23.xi.1975, Rex Filson 15641 & Sue Filson (MEL 1018607).

Queensland — Mt. Walker, 15 km S. of Hughenden, on conglomerate rocks in *Eucalyptus* woodland, 25.vi.1986, J.A. Elix 20723 & H. Streimann (ANUC); Cloncurry — Townsville Highway, 18 km ESE. of Cloncurry, in sheltered rock crevices in *Eucalyptus* woodland with *Triodia*, 25.vi.1986, J.A. Elix 20682 & H. Streimann (ANUC).

Peltula decorticans (Müll. Arg.) R. Filson, comb. nov. – *Pyrenopsidium decorticans* Müll. Arg., Hedwigia 5: 191 (1892). TYPE: “In West Australia ad saxa silicea: Helms (25.5.1891): no.70”. HOLOTYPE: “No 70. W. Austral. F.v. Mueller 1892 25/5/91 Helms.” (G!). ISOTYPE: “Elder Expl. Exp. 25/5/91 Helms No 70.” (MEL 11100!).

Heppia placodizans Zahlbr., Bull. Torrey Bot. Club 35: 299 (1908). – *Endocarpiscum placodizans* (Zahlbr.) Fink, Mycologia 1: 87 (1909). – *Solorinaria placodizans* (Zahlbr.) Gyelnik, Reprim. nov. Spec. Regni. veg. 38: 307 (1935). – *Peltula placodizans* (Zahlbr.) Wetmore, Ann. Mo. bot. Gdn. 57: 196 (1970). TYPE: “On basaltic boulders” [“vicinity of the Desert Botanical Laboratory near Tucson, Arizona. J.C. Blumer, 1908”]. HOLOTYPE: two labels; “Tucson, Arizona 1908 Coll. J.C. Blumer.” and “Coll. J.C. Blumer 112” (W 2984!).

Thallus saxicolous, areolate, varying from a small solitary rosette less than 1 cm diam. to continuous patches along cracks several cm long; marginal areoles radiate, placodiform, sublobate, discrete, 0.2–0.5 mm wide, to 1.5 mm long, flat to convex, very variable in thickness; central areoles irregularly round, to 0.6–(1.0) mm diam., flat, convex to hemispheric, sometimes becoming subfruticose, to 2 mm tall; margin smooth, sometimes incised and flexuose; upper surface olive to olive-brown, sometimes appearing pruinose, sorediate; soredia in capitate soralia, dark brown to black; lower surface ecorticate, attached to the substrate by extensions of the medullary tissue, the central areoles stipitate, attached to the substrate by a short holdfast; medulla paraplectenchymatous. *Apothecia* totally immersed in almost hemispheric central areoles; disk colourless or very pale reddish-yellow, punctiform, rarely slightly expanded, emarginate; hymenium to 90 μ m tall; asci polysporous, 75–90 \times 15 μ m; ascospores hyaline, globose to subglobose to narrowly ellipsoid, 3–8 \times 3–4 μ m diam. *Pycnidia* not seen.

REACTIONS: *Thallus* K –, C –, KC –, P –; epihymenium K –; hymenium I + pale blue-green becoming deep reddish-brown.

DISCUSSION:

The holotype of *Peltula decorticans* was collected by Richard Helms, biologist on the Elder Exploring Expedition, in the vicinity of Arcoellinna Well, Everard Ranges, South Australia on 25.v.1891. It was sent to J. Müller by Ferdinand Mueller, Government Botanist of Victoria, in 1892.

This species is fairly common on inland acid rocks where it favours the cooler rock faces and sheltered ledges. Its colour varies, being pale olive in sheltered habitats and dark olive-brown in exposed sites. As Wetmore (1970) observed, it is often found in association with *Peltula euploca* and very small thalli of that species are difficult to separate from *P. decorticans*. It may be found growing with *P. zahlbruckneri* and non-sorediate, hemispheric, central areolae of *P. decorticans* can be very similar to those of that species. Some colonies (MEL 1018626) with typical radiate areoles at the margins which are attached to the substrate by extensions from the paraplectenchymatous tissue of the medulla (Fig. 4g), have in the centre several large, flat, peltate squamules, which are attached to the substrate by a holdfast. The colour and texture of the upper surface is seemingly identical; the capitate soredia of the marginal squamules appear indistinguishable from the marginal soredia of some of the central squamules. This, at first, may suggest that these are growth forms of the same taxon. However the species can easily be separated by the structure of the medulla.

Some samples from the Mt Isa region of Queensland (*Elix* 20646, 20661) appear to lack the radiate marginal squamules but the central areolae, though a little larger than typical, structurally agree with the central areolae of *P. decorticans*. One specimen from the Hervey Range (*Elix* 20445) has large central areolae up to 2.0 mm diam. which are affixed to the substrate by a central holdfast. The lower surface and outer layer of the holdfast appear to be corticate, but as the structure

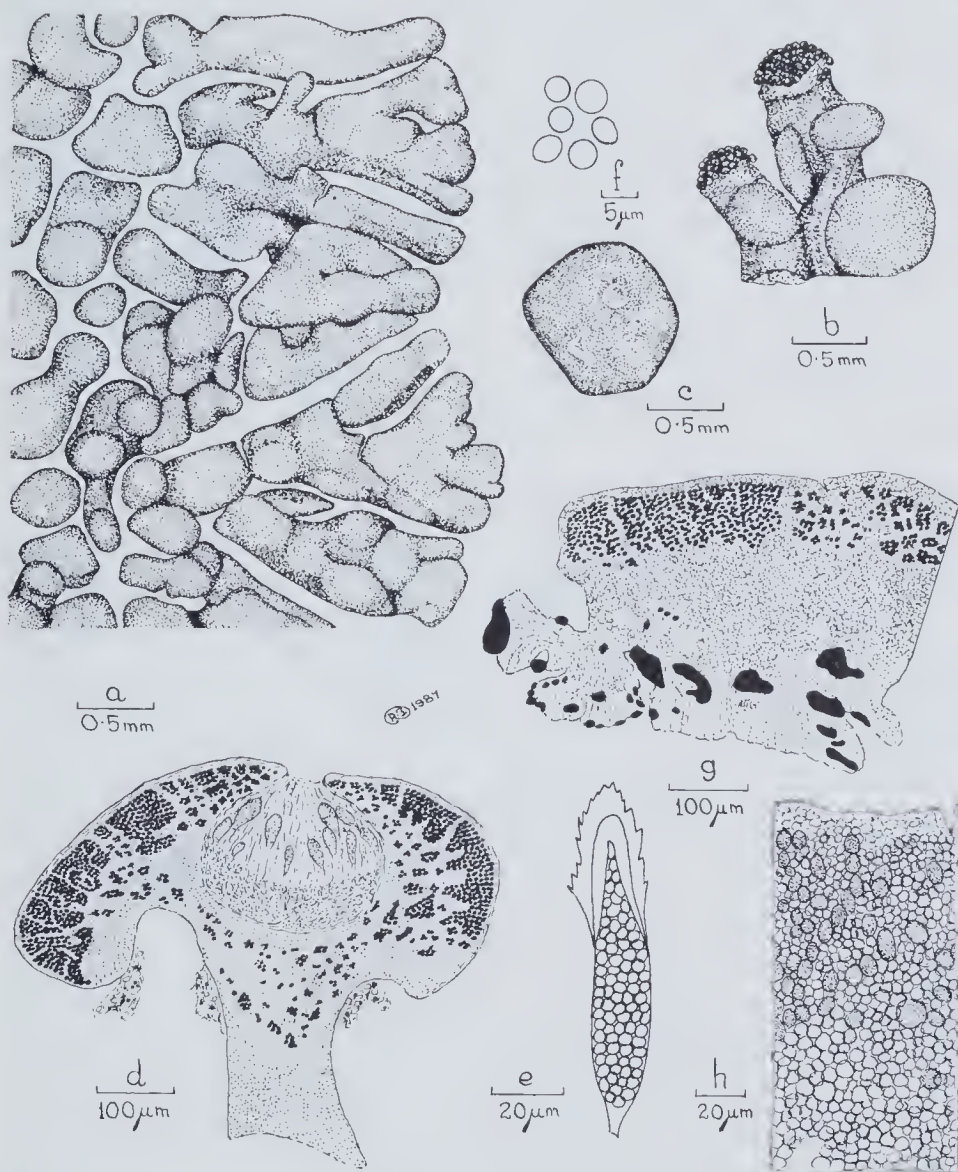


Fig. 4. *Peltula decorticans*. a — portion of the thallus showing radiate marginal areoles and central convex areoles. b — central subfruticose areoles with capitate soralia. c — fertile hemispheric areole. d — section through fertile areole. e — ascus. f — mature ascospores. g — section through marginal areole showing attachment to the substrate by extensions from the medulla. h — enlargement of cortex, algal zone and paraplectenchymatous medulla. a, b, e, f from MEL 1011767; c, d, g, h from MEL 1018107.

of this layer is similar to the paraplectenchymatous medulla it is difficult to ascertain whether it is a true cortex. The marginal areolae are affixed by the medulla and in all other respects the sample agrees with *P. decorticans*. I have hesitated therefore in describing it as distinct until more material becomes available.

The holotype of *Heppia placodizans* Zahlbr. is represented on three rock fragments in Zahlbruckner's herbarium in Vienna. The thalli are lobate-placodiform, sparsely sorediate with capitate, dark brown soralia and are similar in every way to *Peltula decorticans*.

SELECTED SPECIMENS EXAMINED (total 13):

Northern Territory – Native Gap, Hann Range, 114 km N. of Alice Springs, on protected rock ledges with a southerly aspect, 12.ix.1983, *J.A. Elix 11189b* & *L.A. Craven* (ANUC); Macdonnell Range, 1 km E. of Pine Gap, in *Acacia* – *Callitris* woodland on sandstone rocks with a southerly aspect, 17.ix.1983, *J.A. Elix 11293* & *L.A. Craven* (ANUC).

South Australia – Wynbring Rocks, 1.2 km N. Wynbring on Transcontinental Railway Line, 28.x.1970, *Rex Filson 11946* (MEL 1018626); Flinders Ranges, Copley – Balcanooka Road, 13 km E. of Copley, rocky ridge in chenopod shrubland, 30.x.1984, *J.A. Elix 17998* & *L.H. Elix* (ANUC); Flinders Ranges, Moralana Gorge Road, 35 km N. of Hawker, in open grassland with stunted *Acacia*, 28.x.1984, *J.A. Elix 17823* & *L.H. Elix* (ANUC).

Queensland – Mt Farrenden, 26 km SSW. of Charters Towers, on sandstone rocks in dry sclerophyll forest on rocky slope, 22.vi.1986, *J.A. Elix 20581* & *H. Streimann* (ANUC); The Maiden Mountain, 40 km WNW. of Bowen, in *Eucalyptus* – *Planchonia* dominated woodland, on granite rocks, 3.vii.1986, *J.A. Elix 21185* & *H. Streimann* (ANUC); Lake Julian Road, 20 km NE. of Mt Isa, in sheltered rock crevices in gorge in *Eucalyptus* woodland with *Triodia*, 24.vi.1986, *J.A. Elix 20646* & *H. Streimann* (ANUC).

***Peltula euploca* (Ach.) Poelt ex Ozenda & Clauzade**, *Les Lichens* (Paris): 775 (1970). – *Lichen euplocus* Ach., *Lich. Succ. Prod.*: 141 (1798). – *Peltula euploca* (Ach.) Poelt, *Mitt. Bot. StSamml. Munch.* 4: 471 (1962), comb. inval. TYPE: “Sweden, Westring”. HOLOTYPE: “Suecia” (H-ACH 857, photo only seen).

Endocarpiscum obscurans Nyl., *Bull. Soc. linn. Normandie ser.2*, 6: 309 (1872). – *Heppia obscurans* (Nyl.) Nyl. in Hue, *Rev. Bot. Bull. Mens.* 5: 18 (1886). – *Heppia guepinii* var. *obscurans* (Nyl.) Boist., *Nuov. Fl. Lich.* 2: 87 (1903). – *Peltula obscurans* (Nyl.) Gyelnik, *Reprim nov. Spec. Regni. veg.* 38: 308 (1935). TYPE: “Collioure”. LECTOTYPE: (selected Gyelnik 1935): “Pyren. Orient. Collioure W. Nylander 4 Jul 1872” (H-NYL 30897!).

Thallus squamulose, usually solitary, saxicolous, peltate, irregularly round to sublobate, to 10 mm diam., usually monophyllous but occasionally polyphyllous, attached to the substrate by a central holdfast of fasciculate hyphae; margins smooth, entire, lobed or slightly lacerate, usually thickened, down-turned and sorediate; upper surface olive-green to brown to almost black, shining or sometimes dull, smooth, becoming rugulose, areolate and cracked in older specimens, sometimes with soredia along the older cracks, sometimes with soralia, the soredia farinose, blue-grey to greyish-brown; lower surface smooth, pale pinkish-brown to red-brown becoming darker toward the margins; upper layer to 120 μ m thick, this layer consisting of rounded cortical cells and algal colonies; medulla white, euthyplectenchymatous, loosely compacted; lower cortex to 60 μ m thick. *Apothecia* immersed, 1-several per squamule, 0.1-0.7 mm diam.; disk punctiform, reddish-brown, emarginate though sometimes with a thickening of the thallus around the disk; hymenium to 215 μ m tall; paraphyses thin, 1.5 μ m thick, branched, anastomosing only slightly, thickened at the apical cell; asci 111 x 15 μ m, polyspored; ascospores simple, hyaline, subglobose to ellipsoidal, 6-8 x 3-4 μ m.

REACTIONS: Thallus K–, C–, KC–, P–; epihymenium K–; hymenium I+ pale blue quickly becoming brownish-red.

DISCUSSION:

Peltula euploca is the most often collected species of *Heppia* and *Peltula* in Australia. It occurs on both calcareous and acid rocks, in wet and dry habitats.

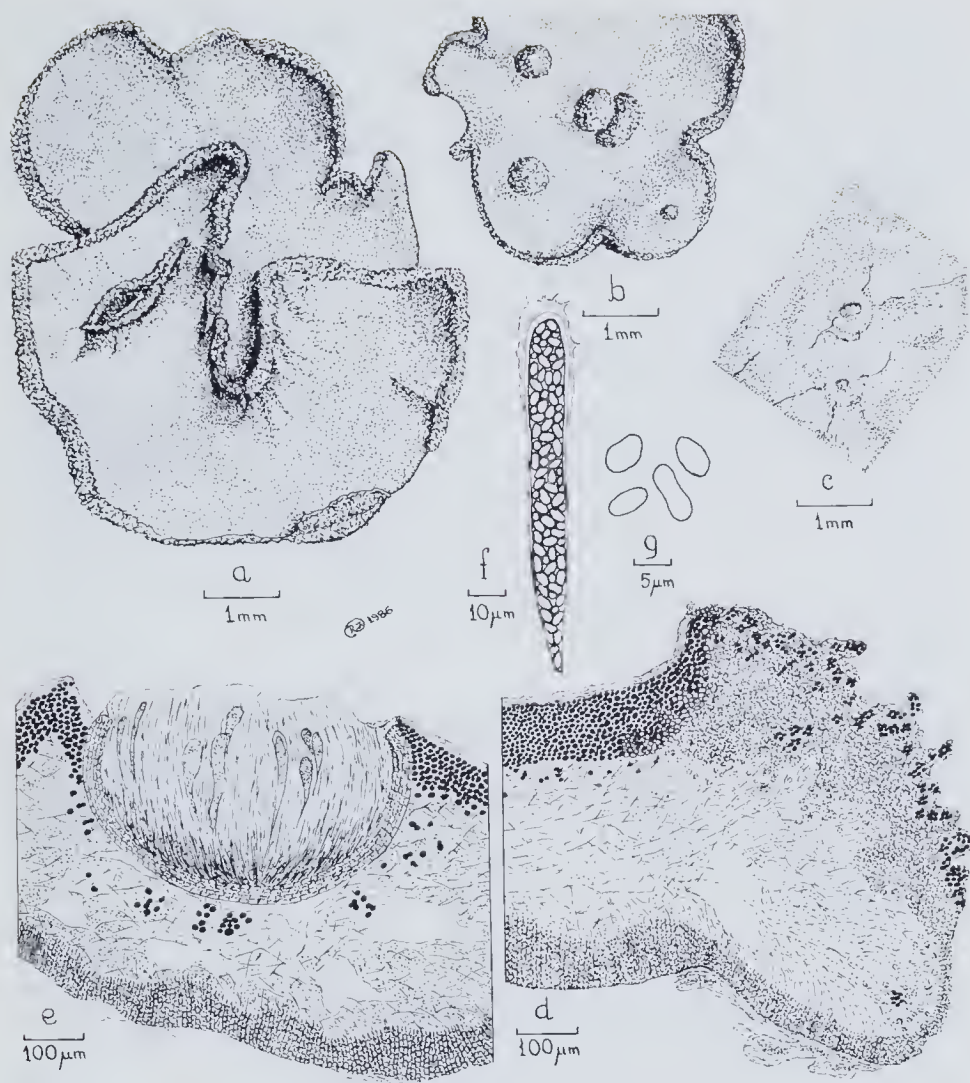


Fig. 5. *Peltula euploca*. a — sterile thallus with sorediose margins. b — portion of thallus lobe showing sorediose margins and hemispheric soralia. c — portion of thallus lobe showing two immersed apothecia. d — section through sorediate margin of thallus. e — section through apothecium. f — ascus. g — spores. a, from MEL 1029256; b, from MEL 1017847; c, from MEL 5781; d, e, from MEL 1018925; f, g, from MEL 1018637.

The thallus is very variable in shape, sometimes being small, to 2 mm diam., almost round, with smooth, thinly sorediose margins, and sometimes greater than 2 mm with flexuose, heavily labriform-sorediate margins. The upper surface is variable in colour, from pale olive-green to grey to almost black, sometimes white pruinose. All forms appear to grade into one another and colonies of one form often have individual thalli of another mixed with them. Thalli are also very variable in size, often as small as 1 mm, but the species is always easily identified by the soredia on the margins, along the cracks in the upper surface or on laminal soralia. Fertile specimens are not common but *P. euploca* is rarely found without soredia.

Peltula euploca is very similar to *P. bolanderi* and small thalli are sometimes difficult to separate from those of that species. The upper surface of the thallus of *P. euploca* is always smooth in small specimens whereas in *P. bolanderi* the surface is rugulose and cracked.

Two specimens (*Elix 11183, 11189b*) from the Hann Range, 114 kilometres north of Alice Springs, are atypical. The thalli are to 3 mm diameter, deeply lobed and divided, with sorediose margins which tend to be raised and flexuose. The upper surface is light olive-green and thickly white-pruinose with a distinct dark margin. The form of the thallus is similar to *P. bolanderi* but the thalli are much larger than in that species and are solitary on the substrate. The general appearance of the thallus suggests that a new species may be involved but until more collections become available I prefer to include this material under *P. euploca*.

Gyelnik frequently selected lectotypes without the examination of all relevant syntype specimens and this has led to nomenclatural confusion in several instances. He (Gyelnik 1935) chose H-NYL 30897 as the lectotype of *Endocarpiscum obscurans* Nyl. but Wetmore (1970) rejected this choice and instead chose another specimen H-NYL 30900. Gyelnik's lectotype is undoubtedly *Peltula euploca* and even though Gyelnik discussed the specimen thoroughly, comparing it with *P. guepinii*, he was not certain whether the taxon should, or should not, be considered sorediose. The specimen that he chose as lectotype is sorediose so I cannot find any grounds for overthrowing Gyelnik's choice. Therefore the name *Endocarpiscum obscurans* Nyl. must be placed in synonymy under *Peltula euploca* and another name found for the species currently known (following Wetmore's 1970 interpretation) as *Peltula obscurans* (Nyl.) Gyelnik. The next available name for this taxon is *P. subglebosa* (Müll. Arg.) R. Filson, q.v.

SELECTED SPECIMENS EXAMINED (total 64):

Western Australia – Quartzite rock at Galvins Gorge, Gibb River Road c. 25 miles N. of turnoff to Mt House H.S., 25.vii.1974, *J.H. Willis* (MEL 515454); Carson Escarpment, c. 40 km S. of Carson River Homestead in Drysdale River National Park, N. Kimberlies, 10.vi.1984, *J.H. Willis* (MEL 1050511 pr. p.); Wapet road, 21° 00' S., 123° 10' E., -i.1980, *A.S. Mitchell 1102 pr. p.* (MEL 1026834).

Northern Territory – Mulga Park on Ernabella-Mulga Park road, 26.vi.1965, *A.C. Beauglehole 13602* (MEL 1018106); S. facing slope of quartzite hill, Blatherskite Range, Alice Springs, 26.ii.1976, *P.K. Latz 6399* (MEL 1017856); S. facing slope of sandstone hill, 25 km SW. Alice Springs, 24.ii.1976, *P.K. Latz 6389* (MEL 1017838); S. facing side of shistose rock outcrop, 4 km E. Alice Springs, 26.ii.1976, *P.K. Latz 6409* (MEL 1017847); N. side of the lower falls, Edith Falls, 20.vii.1965, *A.C. Beauglehole 13791* (MEL 1018637).

South Australia – Murrawidgin Cave No.2, 6 miles N. of Eyre Highway, 7.i.1952, *D.S. Kemsley* (MEL 1011697); Rocky outcrop N. of Ernabella road, 4 miles W. of Kenmore Park Homestead, Musgrave Ranges, 26.xi.1975, *Rex Filson 15698 & Sue Filson* (MEL 1018604); Ilbillie area, Everard Ranges, 24.vi.1965, *A.C. Beauglehole 13579* (MEL 1018634); 3 km N. of Kokatha on the Poochera-Kingoonya road, 26.x.1970, *Rex Filson 11911* (MEL 1018621); Waukaringa mines near Koonmore road, 18.xii.1969, *R.W. Rogers 1822* (MEL 1011686).

New South Wales – Lower slopes of the Wedding Cake, Yodellers Ridge, Widden Valley, 16.iv.1979, *Rex Filson 16682* (MEL 1027838); Prope Jenolan Caves, 9.ix.1897, *F.R.M. Wilson* (NSW L2941); 9 miles E. of Cooma on the Numeralla road, 2.xii.1965, *Rex Filson 7896* (MEL 1021165).

Australian Capital Territory – Gudgenby Gorge, 4 km S. Tharwa, 26.vii.1979, *Rex Filson 16753* (MEL 1516130).

Victoria – Rowsley on the Parwon River, 3 miles S. of Bacchus Marsh, 27.xii.1901, *R.A. Bastow* (MEL 5781); On basaltic rocks, Little River, 26.i.1897, *F.R.M. Wilson* (NSW L2943); Braybrook, 18.x.1900, *R.A. Bastow* (MEL 5783); On rocks in stony outcrop 2-3 miles SSW. Beeac, 8.ii.1952, *A.C. Beauglehole 3241* (MEL 10233390); Dingy Cove, Lady Julia Percy Island Wildlife Reserve, 28.xii.1974, *A.C. Beauglehole 73415* (MEL 1045757); Point Wilson, 15 km NE. Geelong, -iii.1980, *Anne Geddes* (MEL 1029253).

Tasmania – Meadowbanks Road near Hamilton, 12.vii.1970, *G.C. Bratt & J.A. Cashin 70/807* (MEL 1011687).

Peltula imbricata R. Filson, sp. nov.

Thallus imbricatus, ad 10 mm diam., lobus concavus, ad 0.7 mm diam. *Apothecia* adnata, ad 0.7(-1.0) mm diam., margine conspicuo, asci polyspori, ascosporae hyalinae, oblongo-ovoideae 6-7 x 3 µm.

Thallus terrecolous, of small imbricate lobes, tightly appressed to the substrate, forming small colonies or a continuous crust to 10 mm diam.; lobes concave, to

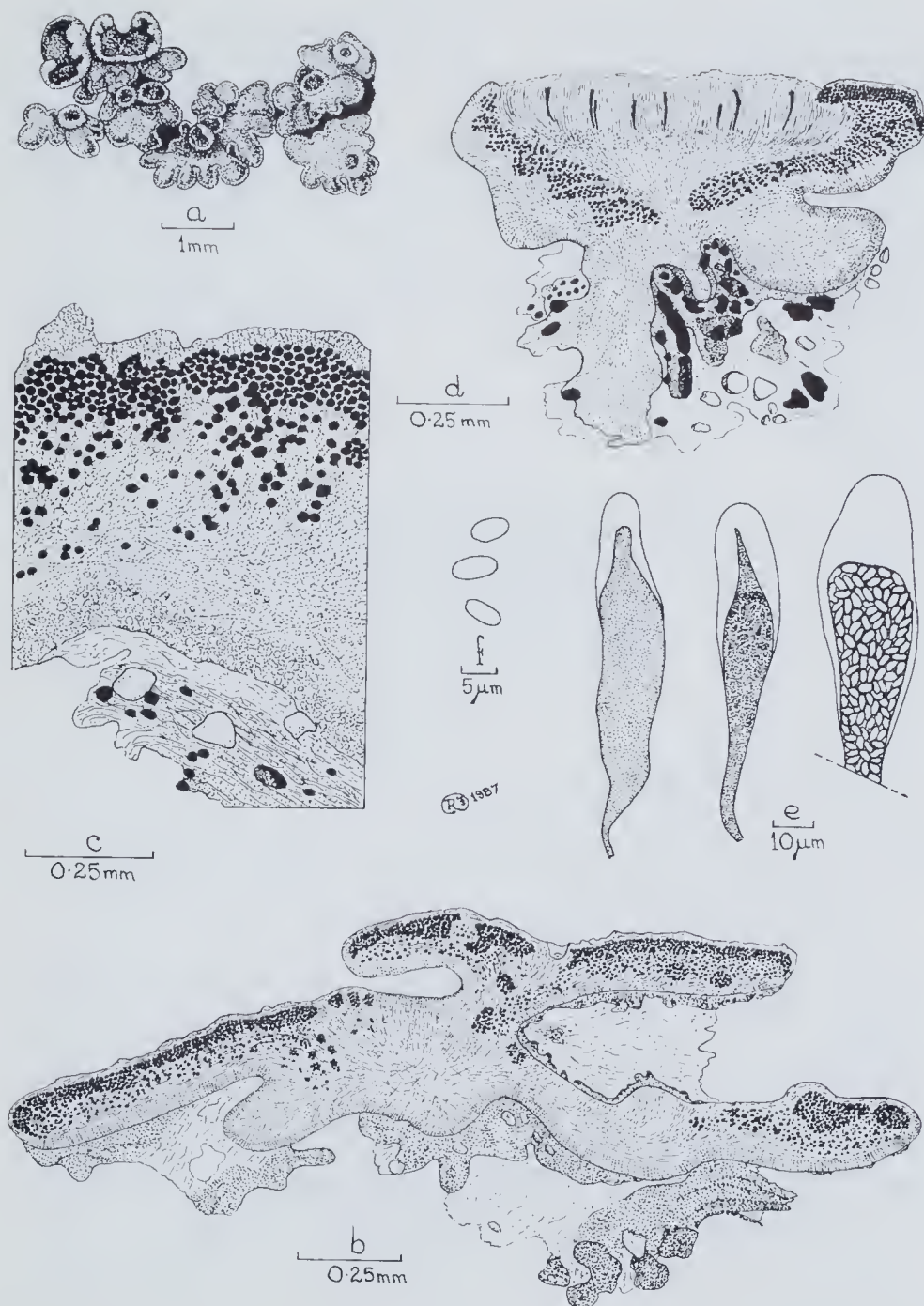


Fig. 6. *Peltula imbricata*. a — thallus from above showing general habit. b — section through portion of thallus showing imbricate lobes. c — enlargement of portion of thallus section showing paraplectenchymatous tissue in the upper portion of the medulla and euthyplectenchymatous tissue in the lower. d — section through apothecium. e — three asci from the hymenium. f — ascospores. All from the holotype, MEL 1050656.

0.7 mm diam.; upper surface smooth, olive-green, sometimes appearing pruinose; pruina pale yellow or white; margins smooth, olive-brown, epruinose, slightly raised; lower surface corticate, pale pink to pinkish-brown, attached by thick cords which penetrate deep into the substrate; upper cortex to 12 μm thick; medulla moderately to loosely compacted, euthyplectenchymatous; lower cortex to 30 μm thick. *Apothecia* sessile, to 0.7(-1.0) mm diam.; margin thick, concolorous with the thallus; disk reddish-brown; hymenium to 120 μm tall; paraphyses thin, 1.0 μm thick, conglomerate; apical cell expanded to 4 μm ; asci polyspored, 78-90 x 22-27 μm ; ascospores hyaline, ellipsoid, 6-7 x 3 μm . *Pycnidia* not seen.

HOLOTYPE: Macdonnell Range, 1 km E. of Pine Gap, 23° 49' S., 133° 45' E., in *Acacia* - *Callitris* woodland on soil, 17.ix.1983, J.A. Elix 11319 & L.A. Craven (MEL 1050656). PARATYPE: Hillside Simpsons Gap National Park, rare on soil pocket between boulders, 23° 42' S., 133° 42' E., 11.iii.1976, P.K. Latz 6540 (MEL 1017812).

REACTIONS: Thallus K -, C -, KC -, P -; epihymenium K - or + yellow; hymenium I+ deep blue.

DISCUSSION:

This new species is very distinctive and readily identifiable in the field by its small congested imbricate lobes. The medulla varies from being paraplectenchymatous in the upper parts of the thallus and at the tips of the lobes to moderately to loosely euthyplectenchymatous in the thicker parts of the thallus.

FURTHER SPECIMEN EXAMINED:

Northern Territory - Sheltered area on S. scree slope of quartzite hill, Blatherskite Range, Alice Springs, rare amongst moss, 23° 46' S., 133° 52' E., 26.ii.1976, P.K. Latz 6402 (MEL 1017842).

Peltula omphaliza (Nyl.) Wetmore, Ann. Mo. bot. Gdn. 57: 194 (1970). - *Heppia omphaliza* Nyl. in Eckf., Bull. Torrey Bot. Club. 16: 106 (1889). - *Endocarpiscum omphalizum* (Nyl.) Müll. Arg., Hedwigia 34: 28 (1895). TYPE: "Mexico. Gulf of California, island of San Pedro Martin, Palmer 1887". HOLOTYPE: Outside of packet "California Eckfeldt." and on the label in the packet "20 *Heppia* sp novo Lower California rocks near the sea J.W. Eckfeldt" (H-NYL 30893!).

Thallus saxicolous, squamulose, peltate, irregularly round, to 2 mm diam., flat to slightly convex; margins smooth, entire or slightly lobed; upper surface olive-green to pale brown with a darker brown margin, smooth, dull or occasionally slightly shining; lower surface smooth to wrinkled, sometimes distinctly ridged, pale buff with one or more holdfasts attaching the squamule to the substrate, sometimes when growing on a loose substrate the lower surface is thickly covered with pale brown hyphae; upper layer thick, almost filling the areole; medulla thin, euthyplectenchymatous. *Apothecia* solitary or several per squamule, immersed; disk at first punctiform, later expanding to 0.75 mm diam., without a thalloid margin or sometimes an expanded apothecium almost fills an areolae and then the margin appears thalloid; hymenium to 150 μm tall; asci 60-90 x 21-27 μm with a gelatinous sheath, polyspored; ascospores globose to ellipsoidal, hyaline, simple, 5-7 x 3 μm . *Pycnidia* globose, immersed in the thallus; microconidia not seen.

REACTIONS: Thallus K -, C -, KC -, P -; epihymenium K - or K + red; hymenium I+ blue becoming red.

DISCUSSION:

Peltula omphaliza is very common on limestone rocks and on pebbles lying on the ground. In some forms it is difficult to separate from *P. euploca* and *P. zahlbruckneri*. However, the thallus is never sorediate, always squamulose, peltate

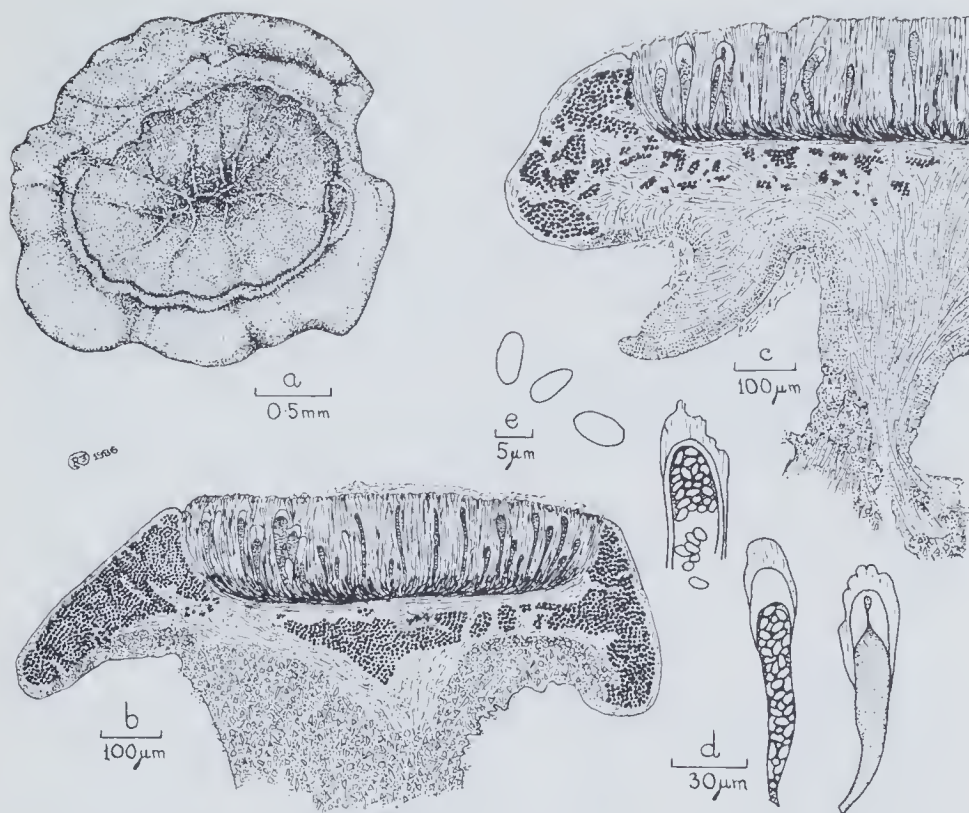


Fig. 7. *Peltula omphaliza*. a — thallus from above, showing one large apothecium almost covering the areole. b — section through thallus showing apothecium and holdfast, outer layer of holdfast heavily embedded with crystals from the substrate. c — section through portion of thallus showing apothecium, ridged lower surface and holdfast. d — asci from the hymenium, on the left is a broken mature ascus. e — ascospores. a, b, d, e, from MEL 1021176; c, from MEL 1047118.

and flat to slightly convex on top and the squamules have an undulate to flexuose margin. At most times *P. omphaliza* has a fairly large, expanded apothecium, whereas the apothecia of *P. euploca* and *P. zahlbruckneri* are always immersed and punctiform. These three species all have a euthyplectenchymatous medulla.

SELECTED SPECIMENS EXAMINED (total 7):

Western Australia — Giles Meteorological Station, Rawlinson Ranges, c. 1966, Noel Barrett (MEL 1011696).

Northern Territory — George Gill Range, Carmichael Crag, 9.iii.1968, A.C. Beaglehole 26400 (MEL 1046347); near old Angus Downs Station H.S., 12.ix.1965, J.H. Willis (MEL 11250); Ooraminna Rock Hole, 40 km S. of Alice Springs, 26.vii.1968, A.C. Beaglehole 27718 (MEL 1047118).

South Australia — Everard Ranges, Mt Illbillie area, 28.vi.1968, A.C. Beaglehole 25622 (MEL 1046344); NW. Plains, Serpentine Lakes (Serpentine Lakes are c. 250 km N. of Deakin on the Transcontinental Railway), 19.vii.1972, N.N. Donner 3959 (AD 97807134).

Peltula patellata (Bagl.) Swinscow & Krog, Norw. J. Bot. 26: 221 (1979). — *Acarospora patellata* Bagl. Nuov. Giorn. Bot. Ital. 7: 245 (1875). — *Heppia patellata* (Bagl.) Stizenb., Ber. That. St Gall. naturw. Ges. 1889-90: 190 (1890). TYPE: "Ad saxa granitica decomposita montis *Deban*." HOLOTYPE: "Abissinia settentrionale,

paese dei Bogos, Abita, Keren, sul Mte Deban fra i 4500 e i 5500 p, O. Beccari 74, 1870" (FI n.v.).

Peltula polyspora (Tuck.) Wetmore, Ann. Mo. bot. Gdn. 57: 198 (1970). – *Heppia polyspora* Tuck., Syn. N. Amer. Lich. 1: 115 (1882). – *Endocarpiscum polysporum* (Tuck.) Fink, Contr. U.S. natn. Herb. 14: 149 (1910). TYPE: "Mountains of Colorado, T.S. Brandegee; comm. by C.J. Sprague.". HOLOTYPE: Two labels "Sierra Sangre de Cristo Colorado. Coll. T.S. Brandegee." and "Colorado Brandegee (comm. C.J Sprague) 4 1879" (FH!).

Thallus squamulose, terricolous, to 2.5 mm diam., at first flat, becoming deeply concave; margins smooth, entire or lobed, usually thickened and up-turned and slightly raised and often darker in colour; upper surface smooth to rugulose, olive-green to brownish-green, sometimes appearing pruinose; pruina white or yellow; lower surface covered with dense hyphae; hyphae pale brown, branched, anastomosing, septate, to 35 μ m thick and 7 mm long, penetrating deeply into the substrate. *Apothecia* immersed, 1-8 per squamule, to 1 mm diam.; margin absent at first, becoming prominent at maturity; disk open, reddish-brown; hymenium 126 μ m tall including the yellow-brown epihymenium; asci polyspored, 105-110 x 30-33 μ m with a thick gelatinous sheath; ascospores spherical, hyaline, simple, 3-7 μ m diam.

REACTIONS: Thallus K–, C–, KC–, P–; epihymenium K+ red, l+ red; hymenium I+ blue becoming brick-red.

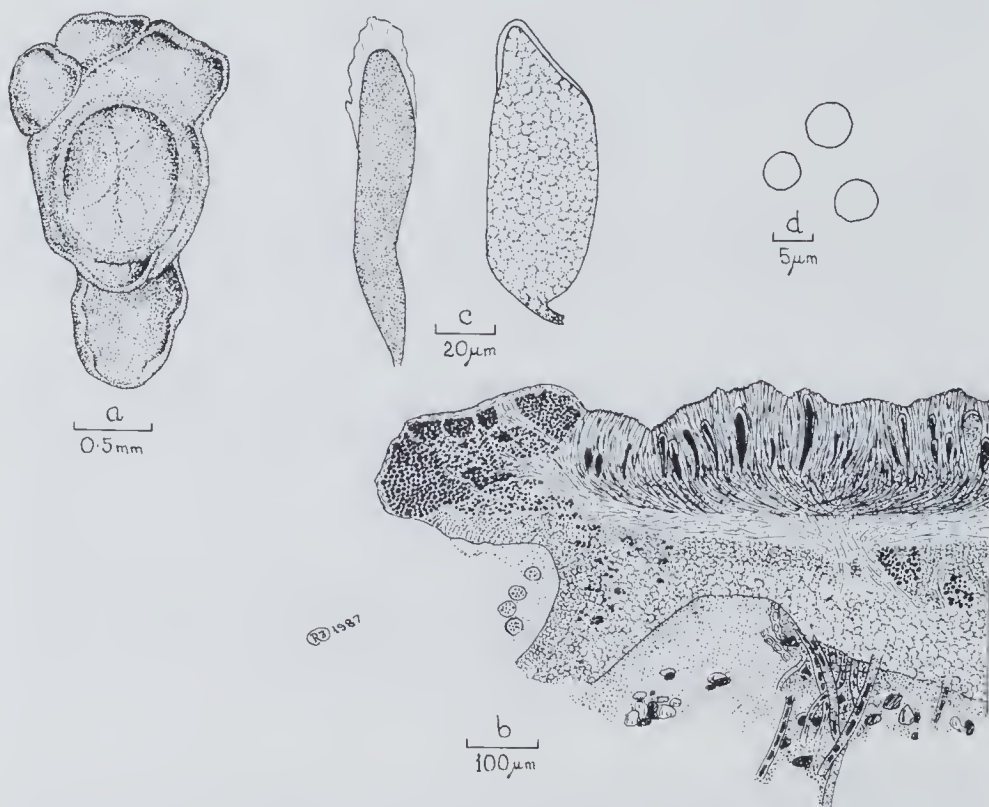


Fig. 8. *Peltula patellata*. a — habit. b — section through part of thallus. c — asci from the hymenium. d — ascospores. a, c, d, from MEL 1020677; b, from MEL 1027028.

DISCUSSION:

Swinscow and Krog (1979) discussed the holotype of *Acarospora patellata* Bagl. saying that it was of poor quality, consisting of a few squamules on crumbling rock. I have not seen this specimen but have accepted Swinscow and Krog's interpretation. The protologue and illustration of spores of *A. patellata* (Baglietto 1875) certainly suggest that that name and *P. polyspora* are synonymous.

SELECTED SPECIMENS EXAMINED (total 21):

Western Australia – 5 miles N. of Giles Creek on Sandy Blight Road, soil in Mulga-*Aristida contorta* shrubland, 23.ix.1969, J.R. Maconochie (BRIU).

Northern Territory – Tanami Desert Wild Life Sanctuary, The Granites, c. 525 km NW. Alice Springs, 19.v.1976, A.C. Beauglehole 50914 (MEL 1045796); Ayers Rock, growing around the base of the rock, 5.vii.1968, A.C. Beauglehole 25881 (MEL 1045785).

South Australia – 6 miles E. of Kingoonya, 23.ii.1966, R.W. Rogers 185 (AD); 8 miles W. of Yunta, 12.ii.1966, R.W. Rogers 119 (AD); Tjatamanga Rockhole, c. 18 km by road SE. of Cheesman Junction, beside the road to Emu Junction, 27° 25' S., 130° 25' E., abundant in wet sand near waterhole and edges of rock outcrop, 27.viii.1978, N.N. Donner 6379 (MEL 1027028).

Queensland – Red Falls, Lolworth Creek, 58 km WNW. of Charters Towers, on basalt rock on great basalt wall, with scattered trees & shrubs, 21.vi.1986, J.A. Elix 20523 & H. Streimann (ANUC); Lake Julian Road, 20 km NE. of Mt Isa, in sheltered rock crevices in gorge in *Eucalyptus* woodland with *Triodia*, 24.vi.1986, J.A. Elix 20647 & H. Streimann (ANUC).

New South Wales – 70 miles S. of Bourke, 30.xi.1966, R.W. Rogers 894 (AD).

***Peltula subglebosa* (Müll. Arg.) R. Filson, comb. nov.**

BASIONYM: *Placodium subglebosum* Müll. Arg., Flora, Jena 72: 510 (1889).

– *Acarospora subglebosa* (Müll. Arg.) Hue, Nuov. Arch. Mus. ser. 5, 1: 162 (1909).

– *Heppia subglebosa* (Müll. Arg.) M. Lamb, An. Parq. Nac. B. Aires 7: 48 (1958)(1959). TYPE: “Saxicola ad Rio Negro et R. Colorado.”. LECTOTYPE: (here chosen): “Riv Negro, Sud-Argentin: Dr. Lorentz. 1882.” (G!); REMAINING SYNTYPE: “Riv Colorado, Sudargentimin: Dr. Lorentz. 1882.” (G!).

Heppia acarosporoides Müll. Arg., Hedwigia 31: 194 (1892). TYPE: “Ad terram in Western Australia, Camp 1: H. sine no”. HOLOTYPE: “West Austral., Camp 1 & 2 Helms 7.6.91. F.v. Mueller 1892” (G!).

Heppia hassei Zahlbr., Beih. bot. Zbl. 13: 157 (1902). TYPE: “Ad saxa granitica, Palm Springs [Hasse no. 817 et 827].” LECTOTYPE (selected Wetmore 1970): “Hasse: Lichen Californici no. 817. Heppia Hassei A. Zahlbr. Palm Springs, ad saxa granitica.” (W!).

Heppia deserticola Zahlbr., Bull. Torrey Bot. Club 35: 300 (1908). TYPE: “On basaltic boulders”. HOLOTYPE: (n.v.). ISOTYPE: “Southward facing tuff, Tucson, Arizona, Station 111 March 1908. J.C. Blumer.” (Herb Bruce Fink 5967 MICH!).

Heppia deserticola var. *minor* Zahlbr., Ann. Mycol. 7: 474 (1909). TYPE: “Arizona, Tucson, an Basaltfelsen (J.C. Blumer)”. HOLOTYPE: (n.v.). ISOTYPE: “on rocks, Tucson, Arizona, March 1908 J.C. Blumer.” (MICH!).

[*Peltula obscurans* sensu Wetmore (1970), non (Nyl.) Gyelnik (1935) – see synonymy and discussion under *P. euploca*.]

Thallus squamulose, saxicolous and terricolous, to 1.5 mm diam., concave, flat or slightly convex; margins thickened, irregularly lobed to flexuose, sometimes becoming almost upright, sometimes appearing polyphylous; upper surface smooth to rugulose, olive-green to olive-brown, sometimes appearing pruinose, pruina yellow; lower surface sometimes covered with thick, pale hyphae, sometimes with a thick, branched, central cord surrounded by thinner hyphae, which penetrate deep into the substrate; medulla paraplectenchymatous in the outer region, becoming euthyplectenchymatous in the centre. *Apothecia* one per squamule, immersed at first, becoming sessile; margin often prominent; disk to 1 mm diam., red-brown; hymenium to 90 µm tall including the pale yellow-brown epihymenium; paraphyses branched, anastomosing, to 1 µm thick, slightly expanded at the apical cell; asci polysporous, 60-75 x 15-18 µm; ascospores irregularly ellipsoid, simple, hyaline, 7-10 x 3-5 µm. *Pycnidia* immersed, irregularly vesicular; microconidia ellipsoid-fusiform, 3-4 x 1.5-2 µm.

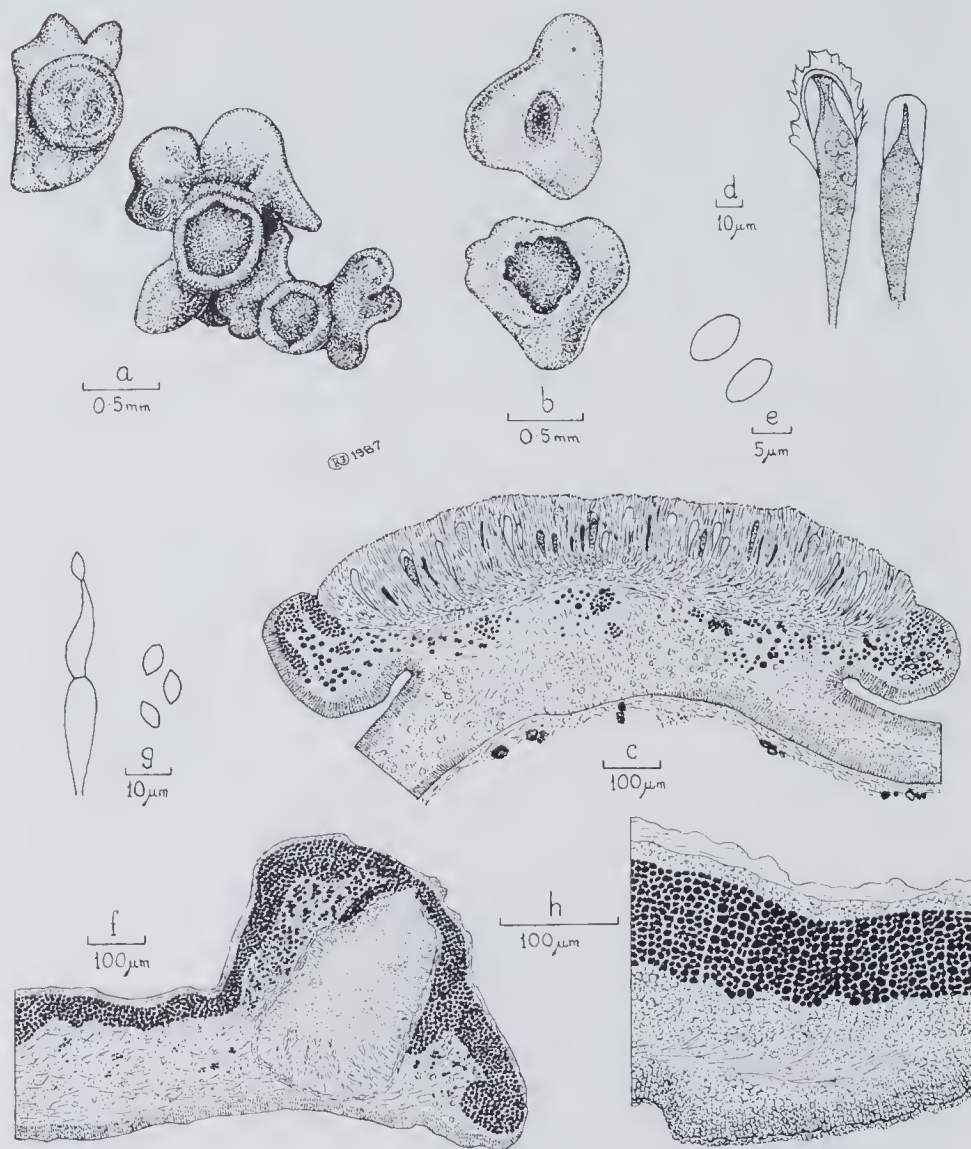


Fig. 9. *Peltula subglebosa*. a — habit showing sessile apothecia with prominent margin. b — habit, the upper thallus shows a young immersed apothecium whilst the lower thallus shows the margin becoming thicker and more prominent. c — section through an apothecium. d — asci from the hymenium. e — ascospores. f — section through the thallus showing a pycnidium. g — conidia-bearing hyphae from the pycnidium (microconidia on right drawn a little larger). h — enlarged section of the thallus showing paraplectenchymatous tissue with a thin band of euthyplectenchymatous tissue in the centre of the medulla. a, c - h, from MEL 1047125; b, from MEL 1020680.

REACTIONS: Thallus K – , C – , KC – , P – ; epihymenium K – or K + red; hymenium I+ pale blue becoming red.

DISCUSSION:

When collected from soil *Peltula subglebosa*, like the other soil-inhabiting species in this group, is difficult to determine in the field as the formation of the thallus is similar in all species with the exception of *P. imbricata*. However, microscopically it is easily separated from *P. australiensis* and *P. patellata* by its small elliptical spores and from *Heppia lutosa* by its polyspored ascus.

The holotype of *Heppia acarosporoides* Müll. Arg. is represented on four small limestone pebbles. There are only a few squamulose thalli present and these agree with other small thalli of *P. subglebosa*. The specimens were collected in South Australia, not Western Australia as stated in the protologue and on the specimen. Richard Helms was botanist on the Elder Exploring Expedition of 1891-92 and the label data suggests that this gathering was made either at Camp 1, at the eastern end of Mount Illbillie, in the Everard Ranges or at Camp 2, a granite outcrop at the western end of the Everard Ranges. The date "7.6.91." is also on the label, and on that day the party travelled between Camp 1 and Camp 2 crossing "undulating sandy country with high granite hills . . . The last two miles were sandy, mulga, brooms, acacia, . . ." (Lindsay 1893:28). The following day, 8.6.1891, they departed westward from Camp 2 crossing "undulating sandy country, with an occasional granite rock just showing and limestone rises with hard soil . . . marked a large gum tree where we crossed the Ferdinand [River] D.L. [David Lindsay, leader of the expedition] 7.6.91" (Lindsay loc.cit.). From this account it would appear that they were a day out of sequence on the expedition and it is possible that this specimen was collected on the 8.6.1891 on the limestone rises to the west of the Everard Ranges, South Australia.

Wetmore (1970) included two species as varieties under *Peltula obscurans* (Nyl.) Gyelnik. One, *Heppia hassei* Zahlbr., is described from Palm Springs, California. The type is represented on three granite chips, the smallest annotated "Lectotype of *H. hassei*". Only one sterile squamule remains on this chip and this agrees with the small rosulate squamules on the other two chips. The other species, *Heppia deserticola* Zahlbr., is one of several described from near the Botanical Laboratory, Tucson, Arizona. The isotype in the University of Michigan is represented on two small pebbles. Only one and a half mature thalli remain on one of these pebbles. I can see no valid criteria by which to separate these species from *P. subglebosa*.

The isotype of *Heppia deserticola*; var. *minor* Zahlbr. was also collected in the vicinity of the Botanical Laboratory, Tucson. This species is also represented on two fragments of stone, on which many thalli of *P. subglebosa* and *P. euploca* are found.

SPECIMENS EXAMINED:

Western Australia – Knox Gorge, Hammersley Range, 15.viii.1965, *A.C. Beauglehole* 14005 (MEL 1028814); Hammersley Range, Yamphire Gorge, 9 miles S. of Wittenoom on the Roy Hill Road, 15.viii.1965, *A.C. Beauglehole* 14012 (MEL 1028812).

Northern Territory – near Mt Palmer, Harts Range, 14.vii.1965, *A.C. Beauglehole* 13742 (MEL 1028860); George Gill Range, Penny Springs Area, 14.viii.1968, *A.C. Beauglehole* 26880 (MEL 1047125); 120 miles W. of Ayers Rock, soil on stony outcrop with Mallee vegetation, 17.ix.1969, *J.R. Maconochie* (BRIU); George Gill Range, Carmichael Crag, 24° 13' S., 131° 33' E., 14.viii.1968, *A.C. Beauglehole* 26880 (MEL 1047125).

South Australia – Koonamore Vegetation Reserve, on sandy slopes of an arid dune, 7.vii.1969, *R.W. Rogers* 1725 (BRIU); Flinders Ranges, 4.5 km S. Beltana, on rocky ridge in Chenopod shrubland, 30.x.1984, *J.A. Elix* 17975 & *L.H. Elix* (ANUC); Appreitinna Creek, 25 km N. Mount Willoughby Station, on conglomerate in *Acacia* scrub, 9.ix.1983, *J.A. Elix* 11051 & *L.A. Craven* (ANUC); Mt Davies Camp, Pipalyatjara Aboriginal settlement, 26° 10' S., 129° 08' E., rock outcrop above camp, moist shady position between rocks, 3.ix.1978, *N.N. Donner* 6721 (MEL 1027050).

Queensland – Red Falls, Lolworth Creek, 58 km WNW. of Charters Towers, on basalt rock on great basalt wall, with scattered trees & shrubs, 21.vi.1986, *J.A. Elix* 20526 & *H. Streimann* (ANUC); 10 miles S. of Charleville, soil in open Mulga woodland, 12.iv.1972, *R.W. Rogers* 1965; (BRIU).

Peltula zahlbruckneri (Hasse) Wetmore, Ann. Mo. bot. Gdn. 57: 205 (1970). — *Heppia zahlbruckneri* Hasse, Bryologist 14: 100 (1911). TYPE: "On quartz in Rubio Cañon, San Gabriel Range, near Pasadena, the type locality. Collected by Mr. C.C. Kingman." HOLOTYPE: "Californica, Rubio Cañon, Sca Gabriel Gebirge bei Paratena. Leg. C.C. Kingsmann com. Hasse." (W!). ISOTYPES: "[Zahlbruckner exs. no.] 1965. America borealis (California): Rubi Cañon in montibus San Gabriel, Los Angeles Co.. ad saxa quartosa (specimina originalia). Leg. H.E. Hasse." (BRI 230314!, W!).

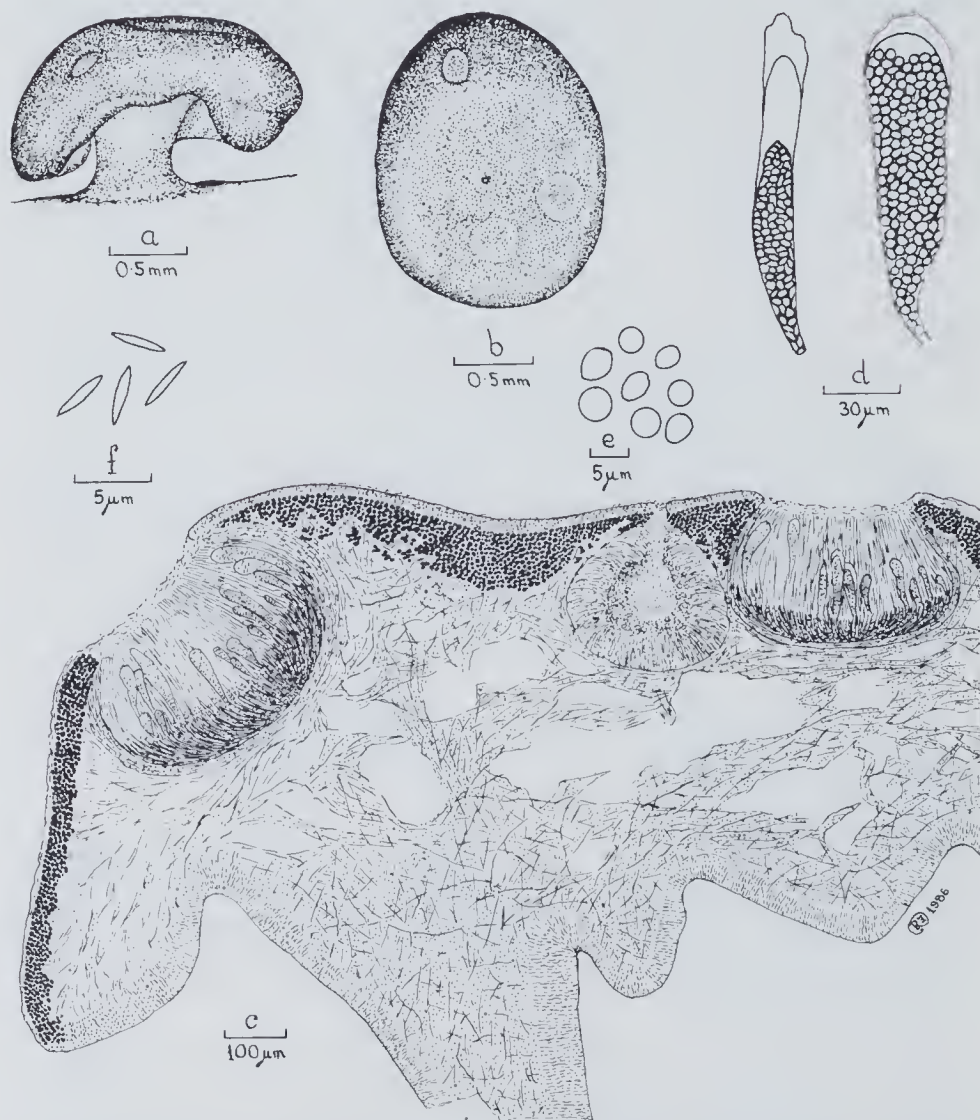


Fig. 10. *Peltula zahlbruckneri*. a — side view of thallus showing holdfast. b — thallus from above. c — section of thallus showing apothecia and a pycnidium. d — asci. e — ascospores. f — microconidia. All from MEL 1018612; a, b, drawn from wet material.



Fig. 11. Known distribution of *Heppia* and *Peltula* in Australia. a — *Heppia lutosa*. b — *Peltula australiensis*. c — *P. bolanderi*. d — *P. decorticans*. e — *P. euploca*. f — *P. imbricata*. g — *P. omphaliza*. h — *P. patellata*. i — *P. subglebosa*. j — *P. zahlbruckneri*.

Thallus saxicolous, of subfruticose squamules aggregated into groups, 1-3 mm tall, upper part expanded to 3 mm wide, round, ellipsoidal, or misshapened by pressure, attached to the substrate by a central holdfast; upper surface smooth,

non sorediate, non isidiate, olive-green to dark olive-brown, dull, sometimes lightly pruinose, sometimes slightly shining, flat on top when dry, slightly convex to inflated when wet; lower surface smooth, yellowish-brown; upper cortex to 12 μm thick; algal layer discontinuous, to 75 μm thick; lower cortex to 75 μm thick; medulla euthyplectenchymatous, loose with many hollow areas. *Apothecia* several per squamule, immersed, to 0.25 mm diam.; disk punctiform, enlarging with age, reddish-brown, shining; margin not prominent; hymenium to 300 μm tall; asci polyspored, 150 x 24 μm with a gelatinous sheath; ascospores globose to subglobose, hyaline, simple, 3.5-5(-7) μm diam. *Pycnidia* immersed, spherical, to 400 μm diam., contents in heavy gel which is difficult to separate; microconidia fusiform, 3-4 x 1 μm .

REACTIONS: Thallus K —, C —, KC —, P —; epihymenium K —; hymenium I+ red.

DISCUSSION:

Wetmore (1970) says that as the collection was attributed to Hasse, specimens in the Crypt. Vind. Exsic. 1965 distributed by Zahlbruckner cannot be type material. I agree that the holotype is most definitely that labelled as being collected by Kingmann (W!) but can see no reason why Zahlbruckner's exsiccata specimens are not isotypes. Hasse (1911) says "Type deposited with Dr. A. Zahlbruckner and type duplicate in Herb. Hasse." It seems reasonable that if the type material was ample that Zahlbruckner would distribute the extra material in his exsiccata; hence he annotated "specimina originalia" to portions of the type material, i.e. isotypes, but incorrectly attributed the collection to Hasse. The lichen material and rock substrate of the W and BRI exsiccata specimens appear indistinguishable from those of the holotype.

SPECIMENS EXAMINED:

Northern Territory - Lower slopes around the edge of Ayers Rock, 21.iv.1970, J.R. Brownlie (MEL 37806); The Olgas, 4.vii.1968, A.C. Beauglehole 25805 (MEL 1046324); Mt Bruce, northernmost peak of Mt Olga domes, 10.ix.1965, J.H. Willis (MEL 11237).

South Australia - Big rock, 5 miles E. of Teeta Bore, Everard Ranges, 24.xi.1975, Rex Filson 15659 & Sue Filson (MEL 1018612).

ACKNOWLEDGEMENTS

I would like to thank the Directors and staff of the Botanical Museum, University of Helsinki, Finland (H), Conservatoire et Jardin botaniques, Geneve, Switzerland (G), Farlow Herbarium, Harvard University, Boston, U.S.A. (FH), Naturhistorisches Museum, Wien, Austria (W), The Herbarium of the University of Michigan, U.S.A. (MICH), State Herbarium of South Australia, Adelaide (AD), Queensland Herbarium, Brisbane (BRI), National Herbarium of New South Wales, Sydney (NSW) and Dr Rod W. Rogers for the loan of specimens.

I would also like to thank Ms Helen Cohn, Librarian, Royal Botanic Gardens and National Herbarium of Victoria, for help in obtaining literary references.

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Manuscript received 12 May 1987.

MUELLERIA: DISTRIBUTION DATES AND PUBLICATION SUMMARY

by

HELEN I. ASTON*

INTRODUCTION

Because the irregular number of issues per volume and the production of double issues of *Muelleria* can cause confusion, it is felt that a summary of the publication history of this journal is warranted.

Table 1 shows the issues and pages of *Muelleria* which have been published in each of volumes 1 to 6, together with the date printed on the cover and the actual date of distribution of each issue. The latter date constitutes the date of

Table 1. *Muelleria*: issues of volumes one to six and their dates of distribution. Bracketed numbers were issued simultaneously in the one cover but with separate title pages.

Volume	Number	Text pages*	Date on cover	Actual date of distribution
1	1	3 - 64	August 1955	22.ii.1956
1	2	67 - 114	15 December 1959	15.xii.1959
1	3	117 - 258†	July 1967	15.vii.1967
2	1	3 - 116	March 1969	25.ii.1969
2	2	119 - 148	August 1971	30.viii.1971
2	3	151 - 188	November 1972	20.xii.1972
2	4	191 - 230†	April 1973	9.iv.1973
3	1	1 - 68	5 July 1974	5.vii.1974
3	2	69 - 164	8 July 1975	8.vii.1975
3	3	165 - 208	15 December 1976	15.xii.1976
3	4	209 - 256†	28 September 1977	28.ix.1977
4	1	1 - 120	July 1978	31.vii.1978
4	2	123 - 204	May 1979	18.v.1979
4	3	207 - 296	April 1980	26.v.1980
4	4	299 - 440	May 1981	20.v.1981
5	1	1 - 118	March 1982	22.iii.1982
5	{ 2 3 }	{ 119 - 184 185 - 228 }	March 1983	7.iv.1983
5	{ 4 5 }	{ 229 - 288 289 - 350 }	March 1984	5.iv.1984
6	{ 1 2 }	{ 1 - 78 79 - 158 }	May 1985	29.v.1985
6	{ 3 4 }	{ 159 - 236 237 - 298 }	May 1986	14.v.1986
6	5	299 - 388	April 1987	1.iv.1987
6	6	389 - 520	February 1988	to be published in vol. 7, no.1

* An unnumbered title page and reverse precedes the text pages cited for each number in all volumes except volume three.
† Includes index for the whole volume.

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effective publication under the International Code of Botanical Nomenclature (1983: article 30).

It is intended that the next issue of *Muelleria* will be volume 7, number 1.

DOUBLE ISSUES

Several of the issues in volumes 5 and 6 consist of two numbers, each with a separate title page, bound in the one cover and issued simultaneously. This style of publication was adopted in order to qualify for concessionary printing costs under the Commonwealth of Australia book bounty legislation. In these issues, the title page of each of the included numbers bears a period of time, e.g. January to June 1985, which is distinct from the date of the common cover. This time period was a requirement relating to book bounty and bears no relationship to the date of effective publication.

TITLE PAGES

Each of the four numbers of volume 3 lacks a title page but has a suitable title heading on its initial text page. The numbers of all other volumes have full title pages, with or without printing (e.g. contents, dates of distribution, figures) on their reverse, with each title page and reverse variously included in, or excluded from, the pagination of the text.

Title pages and lists of contents for complete volumes were published separately for volumes 2 to 5. Those for volume 6 will be published after the last issue of the volume, i.e. number 6, is printed and distributed.

INDEXES

Pages 251-257 of volume 1, 214-229 of volume 2 and 251-255 of volume 3 consist of indexes for the respective volumes. Other volumes lack indexes.

A guide to the taxa and other subjects treated in all issues from volume 1 to volume 6 number 2 can be found in 'An Elementary Index to Australian Herbarium Journals from their Inception to 1985 Inclusive' by H. I. Aston, 1986 (H. I. Aston: South Yarra).

CONTENTS

Volume 6, Number 6	Page
Two new species of <i>Brachyscome</i> Cass. (Compositae: Astereae), with a note on the orthography of the generic name — P. S. Short	389
Three new species of <i>Phebalium</i> Vent. sect. <i>Eriostemoides</i> Endl. (Rutaceae) from south-eastern Australia — Neville G. Walsh and David E. Albrecht	399
Nomenclatural notes on <i>Callistemon</i> R. Br. (Myrtaceae) — P. F. Lumley and R. D. Spencer	411
New species of <i>Buckinghamia</i> F. Muell. and <i>Stenocarpus</i> R. Br. (Proteaceae) from northern Queensland — D. B. Foreman and B. P. M. Hyland	417
Notes on <i>Hovea</i> R. Br. (Fabaceae) : 1 — J. H. Ross	425
Two new species of <i>Pomaderris</i> Labill. (Rhamnaceae) from south-eastern New South Wales — Neville G. Walsh	429
A name change in the genus <i>Acmena</i> DC. (Myrtaceae) — G. P. Guymer and B. P. M. Hyland	437
New species of <i>Caladenia</i> R. Br. (Orchidaceae) from Victoria and New South Wales, Australia — G. W. Carr	439
The botanist Joachim Steetz (1804-1862) — P. S. Short and D. M. Sinkora	449
The lichen genera <i>Heppia</i> and <i>Peltula</i> in Australia — Rex B. Filson	495
Muelleria: distribution dates and publication summary — Helen I. Aston	519

ISSN 0077-1813